# NOTE

This Microfiche meets the quality requirements of the American National Standard for Microfiche of Documents (ANSI PH5.9-1975). However, because of imperfections in the document from which it was made, it contains images that are illegible or difficult to read. The source document for this microfiche is the best copy that could be obtained prior to filming.

CIS Congressional Information Service Washington, D.C.

# ASSESSING CONTRACTOR USE

# IN SUPERFUND

A Background Paper of

OTA's Assessment on

Superfund Implementation

January 1989

**OFFICE OF TECHNOLOGY ASSESSMENT**

**CONGRESS OF THE UNITED STATES**

J952-6

# Office of Technology Assessment

## Congressional Board of the 100th Congress

MORRIS K. UDALL, *Arizona, Chairman*

TED STEVENS, *Alaska, Vice Chairman*

**Senate**

ORRIN G. HATCH
*Utah*

CHARLES E. GRASSLEY
*Iowa*

EDWARD M. KENNEDY
*Massachusetts*

ERNEST F. HOLLINGS
*South Carolina*

CLAIBORNE PELL
*Rhode Island*

**House**

GEORGE E. BROWN, JR.
*California*

JOHN D. DINGELL
*Michigan*

CLARENCE E. MILLER
*Ohio*

DON SUNDQUIST
*Tennessee*

AMO HOUGHTON
*New York*

JOHN H. GIBBONS
*(Nonvoting)*

## Advisory Council

WILLIAM J. PERRY, *Chairman*
*H&Q Technology Partners*

DAVID S. POTTER, *Vice Chairman*
*General Motors Corp. (Ret.)*

EARL BEISTLINE
*Consultant*

CHARLES A. BOWSHER
*General Accounting Office*

S. DAVID FREEMAN
*Lower Colorado River Authority*

MICHEL T. HALBOUTY
*Michel T. Halbouty Energy Co.*

NEIL E. HARL
*Iowa State University*

JAMES C. HUNT
*University of Tennessee*

JOSHUA LEDERBERG
*Rockefeller University*

CHASE N. PETERSON
*University of Utah*

SALLY RIDE
*Stanford University*

JOSEPH E. ROSS
*Congressional Research Service*

## Director

JOHN H. GIBBONS

The views expressed in this background paper are not necessarily those of the Board, OTA Advisory Council, or individual members thereof.

Recommended Citation:

U.S. Congress, Office of Technology Assessment, *Assessing Contractor Use in Superfund—A Background Paper*, OTA-BP-ITE-51 (Washington, DC: U.S. Government Printing Office, January 1989).

Library of Congress Catalog Card Number 89-600700

For sale by the Superintendent of Documents
U.S. Government Printing Office, Washington, DC 20402-9325
(order form can be found in the back of this report)

## OTA Project Staff–Assessing Contractor Use in Superfund

Lionel S. Johns, *Assistant Director, OTA*
*Energy, Materials, and International Security Division*

Audrey B. Buyrn, *Manager*
*Industry, Technology, and Employment Program*

**Joel S. Hirschhorn,** *Project Director*

Kirsten U. Oldenburg, *Deputy Project Director*

Vickie B. Boesch, *Analyst*

Karen L. Jordan, *Research Assistant*

**Administrative Staff**

Christopher N. Clary, *Administrative Assistant*

Diane D. White, *Administrative Secretary*

## Superfund Implementation Advisory Panel

David Marks, *Chairman*
Massachusetts Institute of Technology

Kirk Brown
Texas A&M University

Richard Brownell
Malcolm Pirnie, Inc.

William Child
Illinois Environmental Protection Agency

Henry Cole
Clean Water Action and National Campaign Against Toxic Hazards

E. William Colglazier
Waste Management Institute
University of Tennessee

William B. DeVille
Louisiana Department of Environmental Quality

Deborah Hankins
General Electric Corporation

Bob Harris
ENVIRON Corporation

William N. Hedeman
Beveridge & Diamond, P.C.

Robert G. Kissell
E.I. DuPont de Nemours & Company, Inc.

Steve Lester
Citizens Clearinghouse for Hazardous Waste

William Librizzi
New Jersey Institute of Technology

George Muhlebach
Ciba-Geigy Corporation

Robert N. Ogg
CH2M Hill

Robert B. Pojasek
ChemCycle Corporation

Frank J. Veale, Jr.
Texas Instruments, Inc.

James N. Welsh
John Zink Company

NOTE: OTA appreciates and is grateful for the valuable assistance and thoughtful critiques provided by the advisory panel members. The panel does not, however, necessarily approve, disapprove, or endorse this paper. OTA assumes full responsibility for the report and the accuracy of its contents.

## CONTENTS


Introduction . . . . . 1

Summary . . . . . 3

- Five Key Questions . . . . . 3
- Future Directions . . . . . 7

First Key Issue: To What Extent is Superfund Dependent on Contractors? . . . . . .11

- Alternative Remedial Contracts Strategy . . . . . .14

Second Key Issue: Why Depend on Contracting to Such a Great Extent? . . . . . .21

Third Key Issue: Is the Extent of Superfund's Dependence on Contracting Appropriate? 23

- Superfund Activities and Contracting . . . . . .23
- Needed: Independent Contractor Work and Independent Government Capability .24
- Superfund: Five Years? Twenty Years? Or, More? . . . . . .25

Fourth Key Issue: Does the Extent of Superfund's Dependence on Contracting Reduce Environmental Effectiveness? . . . . . .27

- Technical Problems . . . . . .27
- Examples of Contractor Issues . . . . . .28
- Supply and Demand . . . . . .31
- Infrastructure Development . . . . . .34
- Conflict of Interest . . . . . .35

Fifth Key Issue: Is Superfund's Heavy Dependence on Contracting Cost Effective? . . .39

- Cost Effectiveness of Contracting . . . . . .40
- Government v. Private Sector Costs . . . . . .41
- Procurement . . . . . .42
- Administrative Complexity . . . . . .43
- Dependent Bureaucracies . . . . . .44

**Boxes**

- Box A.--Excerpts from an EPA Contractor Study . . . . . 5
- Box B.--Examples of Tasks in Current Policy Support Contracts . . . . . .26

**Tables**

1. Total Superfund Program Appropriations v. Administrative Cap . . . . . .11
2. ARCS Contractor Tasks . . . . . .13
3. New Technical Enforcement Support (TES) Contracts . . . . . .14
4. Regional ARCS Contracts . . . . . .17

**Figures**

1. Superfund Program: Contracting v. Internal Staff Funding . . . . . 4
2. RPM Salary Distribution . . . . . .33

# Introduction

This background document presents some preliminary findings from OTA's ongoing Superfund Implementation assessment; the final report will be issued later this year. (Previously, OTA examined Superfund in its 1983 report *Technologies and Management Strategies for Hazardous Waste Control* and its 1985 report *Superfund Strategy*.)

To a large extent, the U.S. Environmental Protection Agency's Superfund program attempts to manage environmental cleanups by managing contractors. As Superfund budgets have grown, dependence on contractors has grown. Contracting means that the private sector works for the government and sometimes even conducts the business of the government. OTA's continuing work on Superfund has become focused on two key contractor issues:

1) Does large scale contracting in Superfund compromise environmental performance and is it cost effective?

2) Is there a good balance between using contractors and government workers in Superfund implementation?

In principle, privatization of government programs is not in conflict with the public interest, but **only** if there is effective government management and oversight. Indeed, the latter point is a critical Superfund issue. The effectiveness and efficiency of Superfund contracting depends in large part on how well **government** workers, career professionals, and political appointees design, administer, and review contract work. And because Superfund activities are so technical, good contract management requires **independent** technical expertise of government workers. Inevitably, therefore, discussing Superfund contractors means addressing workforce issues in the Environmental Protection Agency (EPA).

To put the contractor issue in perspective, it is instructive to take a long-term view of cleanups of chemically contaminated sites in the United States. In our 1985 report *Superfund Strategy* we estimated the cost of future cleanups at about $300 billion by government and industry over about 50 years. Today, with new information on how many sites require cleanup and on cleanup costs, that estimate looks low. OTA believes that a more realistic estimate is perhaps $500 billion in cleanup costs facing American society over at least 50 years.[1] However, until now government and industry have probably spent between $5 and $10 billion on cleanups--only 1 to 2 percent of what they may ultimately spend. In a sense, the early experiences with Superfund have been experimental and there is still time to learn from them in order to refine and improve Superfund and other cleanup programs. In the larger debate on Superfund that will intensify during the coming months prior to the next congressional reauthorization, reexamination of the roles of government and contractors could yield a large benefit.

After the program was reauthorized in 1986 by Congress for five years at $8.5 billion, Henry Longest, Superfund program

1 This estimate does not include projections for clean up of Department of Energy facilities.

director, addressed the use of the greatly increased funding:

> A major portion of these resources ... are to be allocated for extra-mural contracts. Consequently, successful pursuit of the Agency's Superfund objectives will depend in large part upon the Program's ability to direct and manage contractor resources effectively.[2]

For many tasks, there really is no alternative to using contractors for Superfund implementation. Originally, Superfund could not have been implemented as quickly as it was without major use of contractors, especially for emergency responses and initial site studies. Superfund will always use contractors, and OTA is not suggesting that the government can do away with contractors in Superfund implementation. However, a serious discussion of the role of contractors in Superfund is needed.

Even though contractors in general are highly professional and want to do a first rate environmental job, how well the public interest is served depends on how well a program is managed by the government. If the government does not demand, measure, and reward quality contractor work, it will not get it. And our research on Superfund since 1980 agrees with findings of the General Accounting Office (GAO), EPA's Inspector General (IG), and environmental groups that poor **technical** performance has been a problem, not all of the time, but all too frequently. Much of this results from the rapid initiation and expansion of the program and the enormous pressures imposed by the public and Congress on the program to perform quickly. The limited number, limited experience, and high turnover of EPA's staff has made it very difficult for EPA to assure the environmental performance and economic efficiency of Superfund's contractors all of the time. And the problem is compounded by the inexperience and high turnover of workers for contractors, resulting from the explosive growth of that industry driven by the higher spending appropriated by Congress.

Understanding the role of contractors in Superfund means looking beyond what contractors do with equipment in the field, at specific sites. **Contractors conduct so many program activities that, taken as a whole, the contracting industry has enormous influence over Superfund, perhaps more than Congress, the public, environmental groups, the news media, and other institutions.**

Superfund's contractors do much more than detailed, engineering work. In a multitude of various work assignments, they play a major role in conceiving, analyzing, and structuring the policies and tasks which make up the Superfund program. In large measure the government (EPA, other Federal agencies, and State programs) depends on contractors for key information, analyses, insights, and management. Many of the government's most experienced workers have become senior managers for contractors and therefore may now be providing advice to more junior government workers. This contractor system is largely hidden from public scrutiny and accountability.

---

2 U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response, OSWER Directive 9242.3-07, memorandum from Henry J. Longest to division directors, (date unclear; March or May 1987).

# Summary

This background paper explores five key questions about contracting in the Superfund program. Here we give a capsule summary of our findings for each key issue and then present some thoughts about the use of Superfund contractors in the future.[3] A more detailed discussion of congressional policy options will be given in the assessment's final report. In the following sections, we explore the key issues in more detail and include several specific examples of contract and contractor problems.

## Five Key Questions

*First, to what extent is the program dependent on contractors?*

During the last eight years, the Superfund program has been increasingly dependent on contractors, who have received between 80 and 90 percent of its funds each year. Over that time, private contractors have received $4 billion from the Superfund program.

Program funds for external spending increased 27 percent in 1989 over 1988, from $946 million to $1.24 billion. For internal, administrative expenses in fiscal year 1989, the Superfund program has $8 million more than it had in fiscal year 1988--an increase of 4 percent, from $182 to $190 million; that is, no real increase in constant dollars. Figure 1 shows how money for contracting (over 80 percent of external funds) has escalated sharply between 1982 and 1989 while, in comparison, funding for EPA staff (about 65 percent of administrative funds) has remained flat.

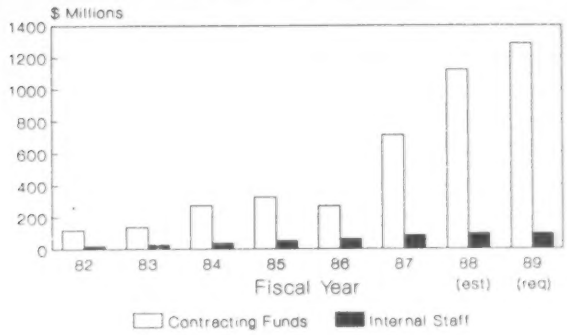
Low funding for EPA staff in general has resulted in low salaries for key Superfund people. Remedial Project Managers (RPMs), for example, who are on the frontline of Superfund implementation, can make less than $20,000 a year while being responsible for several sites, each involving multimillion dollar contractor studies and cleanups. They also have little in-house technical, legal, and administrative support because of limits on EPA staff. A recent contractor study for EPA's Office of Research and Development documents Superfund implementation problems caused by heavy dependence by EPA staff on contractors working for EPA and responsible parties (see box A). To illustrate contracting issues in Superfund, we later discuss the new remedial cleanup Alternative Remedial Contracts Strategy (ARCS) contracts.

*Second, why depend on contracting to such a great extent?*

The dependence on contracting is an outcome of both congressional and EPA decisions in the early 1980s. Originally, there was general agreement that Superfund had to be implemented quickly and would be only a short-term program and that the necessary technical expertise existed in the private sector. Therefore, heavy reliance on contractors seemed to make economic and environmental sense. But we now know that Superfund will be needed for many decades. And it has become clear that the technical difficulties in cleaning up many different types of chemically contaminated sites were--and to some extent remain--quite

3 No discussion of contractor liability is included here. Although contractors and some others believe this to be an important issue, OTA has not seen evidence to connect contractors' concerns about their liabilities with their willingness to enter or stay in the market or their performance. More and more large and small firms of all types have entered the Superfund market. Either contractors have found ways to address their liabilities (e.g., self-insurance, subsidiaries, indemnification, protection by State laws) or the profit potential is great enough to offset concerns.

**Figure 1**
**Superfund Program**
**Contracting v. Internal Staff Funding**




Source: OTA, from EPA's direct obligations budget, as submitted annually to Congress. The amounts on this figure are a subset of those in table 1.

novel compared to past environmental efforts, such as applying air and water pollution control technologies at industrial facilities.

Moreover, the rapid growth of the national cleanup effort, both in Superfund and many other cleanup programs, has meant that technical experience and expertise in the private sector has likely been spread very thin. Before Superfund, there were probably only a few hundred technical people working on cleanups. Now there are probably about 20,000 technicians, engineers, and scientists. Currently, there are not enough appropriately trained and experienced engineers and scientists to implement a high quality and expanding national cleanup program. Moreover, there has been a steady drain of people with experience and expertise away from government to contractors that compromises the environmental performance of Superfund because it makes it harder for EPA to supervise contractors adequately. For example, EPA's Region 2 told OTA that, because of two new, large contracts, they expect to lose 20 percent of their technical staff. All of this suggests that it is now time for Congress to reexamine the use and management of contractors in Superfund.

*Third, is this degree of dependence on contractors appropriate?*

Superfund could not exist without contractors. The issue is how much they do, how the government manages them, and whether contract work is consistent with traditional views on what should be contracted out. For example, developing policies and regulations and providing management and oversight seem the least appropriate activities for contracting out, but contractors do a lot of work in these areas for Superfund that seem to go far beyond supportive information and analysis. (Policy, program, and analytic support contracts total about $75 million over 1987 to 1991.) Government workers hold on to official decisionmaking. But, **the mobility, limited experience, and high workload of the government workforce can cause a subtle shift from control and use of contractor expertise and services to dependence on them (and may well have already done so).**

**BOX A.--Excerpts from an EPA Contractor Study**

"RPMs [Remedial Project Managers] are dedicated, enthusiastic, and energetic, but they feel burdened by their intense site responsibilities, and are aware of a wide gap between their level of skills and knowledge and the requirements of the job. RPMs suggest they lack the resources and support needed to adequately represent and defend EPA's position at the site specific level. They indicate tremendous frustration in that they perceive they, alone, are responsible for critical and costly site decisions. They blame this frustration, along with their low pay (relative to that of private contractors), for the high turnover rates in the RPM position. Provision of technical support and assistance, particularly in the form of standards, guidelines and techniques, is crucial for bridging the gap between RPMs' skills and technical knowledge and their job requirements."

"While RPMs report extensive reliance on EPA contractors for providing TA/TS, [technical assistance/technical support] they are often uncertain about the quality of the contractors' work and the appropriateness of the contractors' suggestions and would like guidance from EPA in these cases."

"... Of the [EPA] scientists in this group some indicate that when problems with technology transfer occur, it is because the RPM lacks the expertise needed to interpret their materials. As one [EPA] lab scientist expressed it: 'You expect a certain level of expertise and you find it's just not there.'"

"... Many of the RPMs believe that the PRPs [potentially responsible parties] often seek the least expensive, rather than the best, clean-up techniques and are willing to expend considerable amounts of money in attempts to establish justification for the less expensive clean-up procedures."

Two statements attributed to RPMs by the study are:

- "The best and the brightest are working for the PRPs."
- "One of my PRPs has a contract with the best geologist in the state ... so I'm going against that person ... I don't have the resources to come back against some of their comments and concerns."

---

Source: U.S. Environmental Protection Agency, *Outreach Initiative on Superfund Remedial Investigation/Feasibility Study (RI/FS)*, contractor report prepared by Barri A. Braddy and Judy A. Holley, Research Triangle Institute, Summer 1988.

Indeed, some contractor activities seem to be activities that the Office of Management and Budget has described as inappropriate for contracting out because they are "inherently governmental" and "require either the exercise of discretion in applying Government authority or the use of value judgement in making decisions for the Government."[4] At the other end of the spectrum, testing at sites (e.g., to measure contamination and delineate the hydrogeology) and the actual physical cleanup work appear to be the most appropriate activities for contracting out.

*Fourth, does this degree of dependence on contracting reduce environmental effectiveness?*

Because of poor quality technical work, this high dependence on contracting is proving to be at odds with the environmental mission of the program (i.e. timely, permanent, and complete cleanups) and desires for a cost-effective program. OTA's work and that by the General Accounting Office and EPA's Inspector General provide evidence of poor environmental performance in Superfund. For example, OTA's June 1988 report *Are We Cleaning Up? 10 Superfund Case Studies* found "that Superfund remains largely ineffective and inefficient." More recently GAO concluded that "Programs to ... clean up waste from old, inactive waste sites have not been well managed."[5] Among those forces which can jeopardize the quality of contractor work are:

- the lack of development of internal EPA expertise, which results in poor contract management and oversight;
- more interest in controlling contractor costs than concern about the environmental performance of contractors;
- a mobile workforce whose perspective on quality, needs, and accountability can shift as it moves from the government--a purchaser of services--to and among contractors--a seller of services; and
- conflicts of interest that arise because working for the government may affect future work in the private sector.

*Fifth, is the dependence on contracting cost effective?*

There is no *data* which proves whether so much contracting, covering so many different activities, is cost effective or not. A detailed independent study would be useful, especially in light of growing concerns about how much cleanups are costing, questions about whether Superfund is needed, and interest in having more cleanups done by responsible parties. Such a study should be conducted by an independent group, because the contracting industry has become a constituency benefiting from a large Superfund program. (Many firms active in the cleanup business have had increases of several hundred percent in revenues and even larger increases in net incomes over the past five years.)

Definitive information may not exist about the cost effectiveness of Superfund contracting, but some trends are clear. First, because demand for cleanup services has grown faster than supply, the government will face increasing costs resulting from inefficiencies (e.g., poorly done work which must be repeated). Also, many people are leaving EPA for higher salaries and better working conditions as contractors. And prime contractors are paid for supervising subcontractors. Thus, **with the explosive growth in demand for talent and services outstripping supply, how can the current high spending levels on contractors be the most cost-effective policy?**

4 Office of Management and Budget, Circular A-76 (revised), Aug. 4, 1983.

5 U.S. Congress, General Accounting Office, Environmental Protection Agency Issues - Transition Series, GAO/OCG-89-20TR (Gaithersburg, MD: General Accounting Office, November 1988).

There is another point to consider. Compared to cleanups managed by responsible parties, EPA probably pays lower unit costs (lower average hourly costs and lower profit margins), but other factors, leading to low efficiency and low contractor productivity, transform low unit costs into high total costs. Constant changes escalate costs; for example, high turnover of Remedial Project Managers, demands for more extensive documentation, changing government policies affecting the analysis and selection of sites and cleanups, and changing of contractors with significant repeating of work. Also, because of regulatory, enforcement, and litigation concerns, government contractors are likely to rely more heavily on expensive worker protection equipment and quality controls for data than contractors working on private cleanups. From looking at actual costs and speaking to contractors and companies which also use contractors for their private cleanups, OTA concludes that it is not uncommon for the government to spend from 100 to 500 percent more than a private client would spend to accomplish the same site study or cleanup. A clearer understanding of how much of this higher cost buys a better cleanup and how much does not would be very useful, particularly from the perspective, shared by many people, that more cleanups ought to be done by the responsible parties, with oversight by government. More enforcement and settlements and more cleanups by industry, however, mean more demands on EPA staff and more demand for workers by contractors.

## Future Directions

There are no easy or quick solutions to these problems. Contractors in Superfund and the other Federal cleanup programs will remain necessary. It seems clear, however, that if Congress wants to achieve major improvements in Superfund it will benefit from rethinking the role of contractors. Doing so also means addressing EPA's Superfund workforce and is, therefore, integral to strengthening EPA's Superfund program.

**Simply pouring more money into Superfund and placing more emphasis on enforcement and privately financed cleanups would not necessarily improve the environmental performance of the system.** Without addressing how EPA uses, selects, and supervises contractors, these actions--like so many cleanups we have examined--are likely to prove an impermanent solution to what we believe are the core problems of poor environmental performance and low cost effectiveness in Superfund.

Some opportunities for congressional examination are:

*1. Reducing the Dependence on Contractors*

For a long-term Superfund program, should some current contractor activities be shifted totally or in part to the government? Answering this question means assessing what tasks make sense for a permanent Federal cleanup program and deciding what funding and government personnel instead of contractors are needed to perform these tasks. The analysis of policies and creation of policy options, evaluation of contractor and EPA regional performance, development of implementation plans for new policies and technical guidance, communication with communities, maintenance of data bases and hot lines, evaluating new technologies and operating technology transfer programs, decisions on need for and extent of cleanup, and using data from contractors to prepare key decision documents (e.g., Records of Decision) and reports to Congress seem to be the kinds of activities which government workers could perform *directly*.

More significant than a shift *in spending* from contractors to EPA, which would still

be small compared to total spending on contractors, would be the shift *in responsibility* from contractors to EPA. Even in highly technical areas, most amenable to using contractors, there would be substantial benefit from having *a small portion* of the work done by government workers. Only in this way, by directly doing technical work, will government workers truly learn the most important technical aspects of the program.

**Reducing dependence on contractors requires addressing workforce issues in EPA, such as the number, experience level, compensation, morale, and technical support systems (i.e., databases, access to technical advice, and continued education) for government professionals.** To make key, *independent* technical decisions government workers need to understand site contamination and risks, cleanups, and contractor work. The government needs to devise a detailed plan, inevitably meaning some higher costs (see option 3), to attract and keep the best and most experienced technical specialists and program managers. Otherwise, contractors will lure them away with higher salaries and other inducements.

*2. Improving Government Management of Contractors*

How can people in EPA regional offices, where most Superfund implementation will always occur, exercise tighter management, quality control, and reviews of contractor activities done directly for the government and for PRPs? Doing so requires more technical people in site project management closely monitoring the substance of contractor work. At EPA headquarters, technical staff with regional experience could independently monitor ongoing regional contractor activities. Early checks for consistency and technical quality are critical to improve the efficiency and effectiveness of Superfund. This need increases as the Superfund program moves toward spending more of its money on site cleanups, which cost much more than site studies. This too means addressing the recruitment and retention of EPA's technical professionals to strengthen the program.

*3. Shifting Superfund Spending*

Can government bring demand for talent and services back into better balance with supply?[6] To improve the near- and long-term environmental performance of the program, Congress can consider **temporarily decreasing, for perhaps five years, annual Superfund spending for contractors by 30 percent to 50 percent (roughly $400 million to $600 million per year).** In the longer term, however, there may well be need for increased spending for contractors. But long-term performance could be improved if, in the near term, money was made available for increasing *government* staff to strengthen EPA's Superfund program by addressing the previous two options.[7] Indeed, improving environmental performance by cutting contractor spending *requires* improving and expanding EPA's workforce. Moreover, for improving the *long-term* national cleanup program, other important ways to use some of the money diverted from contractors in the near term include:

6 The amount cut from contractor spending would be about 10 times greater than the increase for internal EPA spending to address the previous two options. The impact on the consulting industry would be mitigated by the expected increases during the next five years in the cleanup area by other Federal cleanup programs, States, and private industry. Conversely, the current demand/supply imbalance could get worse if Superfund spending remained constant (or increased) and if there was a marked increase in enforcement which caused more responsible party cleanups.

7 Increasing just money would not be sufficient. To increase both the size and the quality of the workforce, the number of allowable full-time equivalents (FTEs) in EPA headquarters and each region would also have to be raised, and the average pay level per FTE would have to increase, ultimately raising the average pay levels in the program. The increase in numbers of government staff would be much smaller than the decrease in contractor workforce. This difference would help cause some shift of people to EPA if working conditions at EPA are also improved.

- substantial increases in government R&D and support of private sector R&D to provide more cost-effective cleanup technologies for particularly difficult sites, like large landfills, and to reduce long-term program costs;
- support for educational programs to train and increase the engineering and scientific workforce for increased contractor activities in the future;
- more support for basic research on health effects of hazardous substances to support more accurate risk assessments; and
- more money for assessing how many sites require cleanup.

*4. Rethinking Cleanup Priorities*

Public support for option 3 critically requires confidence that environmental protection will not suffer. **Reexamining Superfund's priorities means understanding what kinds of current high cost contractor activities could be postponed without threatening public health and environment, versus those which truly are necessary to address urgent site problems.** Establishing better defined and more clearly understood *priorities* for Superfund merits much more attention for its own sake but especially if shifts in spending are considered and if more private party cleanups are sought. For example, some site cleanups are being justified on the basis of speculative future uses of land or water and hypothesized future risky exposures to hazardous substances. (This is one of a number of issues to be discussed in the full report of this assessment.) In contrast, other sites pose significant risks to people under present conditions. And for many sites in the former category, costly cleanups involve impermanent remedies because permanent ones are not yet available. Would waiting to clean up sites which do not pose reasonably certain *present* dangers make sense? (See OTA's 1985 report *Superfund Strategy.*)

*5. Increasing Inspector General Activities*

Provide increased resources for substantially more auditing and investigation by the EPA's Inspector General office of contractor activities. John C. Martin, EPA's Inspector General, recently said:

> Our Superfund resources have not kept pace with the increasing size and complexity of the program and the new mandatory requirements imposed upon us by SARA. We have had to defer audit coverage of many significant aspects of EPA management of Superfund in order to fulfill statutory requirements and provide audit support for burgeoning Superfund procurement. **Superfund is particularly sensitive to fraud, waste and abuse**, requiring a substantial investment in training and the development of new audit and investigative approaches [emphasis added].[8]

These and other options will be discussed further in the full report, due later this year.

---

8 U.S. Environmental Protection Agency, Office of Inspector General, Annual Superfund Report to the Congress for Fiscal Year 1987, September 1988.

# First Key Issue:
# To What Extent is Superfund Dependent on Contractors?

The Superfund program has over $1 billion to spend in fiscal year 1989 to buy contractor and consulting services. That amount is 87 percent of EPA's Superfund budget of $1.425 billion. The balance of the appropriated funds for fiscal year 1989--$190 million--will pay for EPA's administrative expenses: the overhead and staff to manage and oversee the contractors' work.

Each year, Congress, through appropriations, reconfirms the policy to contract out the Superfund program. In the first Superfund appropriation (fiscal year 1982) Congress set a cap on administrative expenses of 21 percent ($41.6 million). Between 1982 and 1989, as the total Superfund budget grew *over 600 percent*, Congress allowed EPA's administrative expenses to grow by only 360 percent (see table 1). Until 1987 the percentage of the cap steadily declined to 10 percent or $135 million. In 1988 the cap rose to 16 percent ($182 million) before it declined again in 1989 to 13 percent. If the percentage of the cap had remained constant since 1982 at 21 percent, EPA would have an additional $109 million for internal spending in 1989--a 60 percent increase. As it is, the Superfund program has $8 million more--an increase of 4 percent--to spend internally in 1989 than it did in 1988; that is, no increase in constant dollars. Meanwhile, external (mostly contracting) funds have increased 27 percent in 1989 over 1988; a substantial growth rate for any industry.

**Table 1.—Total Superfund Program Appropriations v. Administrative Cap**

| Fiscal year | Appropriated funds ($ mil) | Administrative cap ($ mil) | Cap as percent of total funds |
|---|---|---|---|
| 1982 ..... | 200 | 41.6 | 21 |
| 1983 ..... | 210 | 37.4 | 18 |
| 1984 ..... | 410 | 64.0 | 16 |
| 1985 ..... | 620 | 87.6 | 14 |
| 1986 ..... | 900 | 90.0 | 10 |
| 1987 ..... | 1,411 | 135.0 | 10 |
| 1988 ..... | 1,128 | 182.4 | 16 |
| 1989 ..... | 1,425 | 190.0 | 13 |

SOURCE: Fiscal year appropriations acts. The administrative cap is expressed as, "no more than . . . of these funds shall be available for administrative expenses."

Indeed, data from annual reports for public companies active in the cleanup market frequently show growths in annual revenues of from 200 to 300 percent over the past five years from 1984 through 1988, with net incomes often rising at a much higher rate than revenues.[9] Such growth has also meant sudden, large increases in technical staffs. Although much of this growth has been from Superfund work, a lot of money has been coming from other Federal cleanup programs (which are expected to increase), State work, and private cleanups. In the past year, the financial community has been discussing the bright future for environmental

9 The following examples taken primarily from company reports illustrate the state of this contractor industry; the companies are long time major Superfund contractors: 1) Ecology and Environment, Inc., net earnings rose 204 percent from 1984 through 1988, while net income rose 365 percent; as the fraction of earnings from Environmental Protection Agency contracts rose from 60 percent to 70 percent from 1986 through 1988, net income per common share rose 50 percent. 2) Roy F. Weston, Inc. earnings rose 240 percent from 1983 through 1987, while net income rose 970 percent and earnings per share rose 600 percent. Weston said that "Fifty percent of the Company's growth has been due to remedial investigations and 'front-end' studies of hazardous waste sites, which require design, construction management and cleanup activities." Moreover, there was a 72 percent increase in staff from 1986 to 1987 an increase of 774 people in one year. 3) ICF sales increased 216 percent from 1983 to 1987, and from 1987 to 1989 sales are expected to double (no data on profits available). 4) Environmental Treatment and Technology net revenues rose 230 percent from 1983 to 1987, while net income rose 160 percent. In the first half of 1987, the company added over 200 employees for a 25 percent increase. 5) CH2M Hill sales increased 25 percent from 1985 to 1987 while net income increased 82 percent.

services firms, in large measure because of the government cleanup business.

Over the eight-year history of Superfund, some private sector consulting and engineering firms have also, inevitably, gained considerable influence over the direction and content of the Superfund program, while government controls have not kept pace. These firms together perform literally all program activities. They develop policy positions for the program; analyze legislation; implement the SITE technology demonstration program; evaluate potential Superfund sites and, through their analyses, determine whether they qualify for fund-financed cleanup. Contractors analyze cleanup technologies, perform risk assessments, identify feasible cleanup alternatives, and draft Records of Decisions. They design cleanups and do the physical job of cleaning up Superfund sites. Rarely does one contractor do all these tasks.

Contractors write government requests for proposals and scopes of work for new government contracts. Contractors participate in the management and evaluation of other contractors.

Contractors also help EPA deal with the public. They operate the Superfund telephone Hotline that responds to questions from the public--a $9 million contract over 1987 to 1989. They sometimes represent EPA at technical conferences and frequently coauthor papers with EPA staff. Public participation programs are designed and run by contractors; contractors represent EPA at citizen participation meetings, and they sometimes prepare the responsiveness summary for site Records of Decision. Contractors develop and run Superfund training sessions and write Superfund publications, including guidance documents that translate the National Contingency Plan (NCP) regulatory instrument into operating principles. The NCP itself results from extensive contractor work. Contractors research and write reports to Congress for EPA and provide other analyses that Congress and others use to evaluate the Superfund program. Table 2, which is from the statement of work for ARCS contractors, illustrates the broad range of activities in the remedial part of the program.

A small portion of Superfund's external funds go to States through cooperative agreements. States then use the funds to contract out much of the Superfund work for which they have taken responsibility.

Each component of the Superfund program has its own set of prime contractors (not including many more firms which carry out field activities and others which are subcontractors in specialized areas). The remedial program has field investigation team (FIT) contractors and remedial contractors (REM and ARCS). The removal program has emergency removal contractors (ERCS and mini-ERCS), technical assistance teams (TAT) contractors, and environmental services assistance teams (ESAT) contractors. The enforcement program has technical enforcement support (TES) contractors, whose work is nearly invisible to the public. While subcontractors greatly multiply the number of firms participating in the Superfund program, Superfund contract money is funneled through a few large firms. Of the total value of active Superfund contracts (of all types), about 70 percent --$3 billion--is split among six prime contractors.[10]

In 1988 EPA revised its contract concepts for the three components of Superfund.

[10]The firms and the total value of their Superfund prime contracts are: CH2M Hill ($829 million), Ebasco ($504 million), NUS ($492 million), CDM ($409 million), Weston ($388 million), and Ecology and Environment ($364 million). Sometimes significant amounts of money go to subcontractors, although the prime contractor typically makes a fee on those amounts. Also, these same firms may be significant subcontractors on other prime contracts.

**Table 2.—ARCS Contractor Tasks**

1. SITE-SPECIFIC PROJECT MANAGEMENT
   a. Site Planning
   b. Project Monitoring and Control
   c. Project Coordination
2. REMEDIAL PLANNING
   a. Project Planning
   b. Community Relations
   c. Field Investigation
   d. Sample Analysis and Validation
   e. Data Evaluation
   f. Assessment of Risks
   g. Treatability Study/Pilot Testing
   h. Remedial Investigation Reports
   i. Remedial Alternatives Screening
   j. Remedial Alternatives Evaluation
   k. Feasibility Study/RI/FS Reports
   l. Post RI/FS Support
   m. Enforcement Support
   n. Miscellaneous Support
   o. Expedited Response Action
3. REMEDIAL DESIGN
   a. Project Planning
   b. Community Relations
   c. Data Acquisition
   d. Sample Analysis/Validation
   e. Data Evaluation
   f. Treatability Study/Pilot Testing
   g. Preliminary Design
   h. Equipment/Services Procurement
   i. Intermediate Design
   j. Prefinal/Final Design
   k. Post Remedial Design Support
4. REMEDIAL IMPLEMENTATION
   a. Procurement Support
   b. Construction Management
   c. Technical Engineering Services
5. OTHER TECHNICAL AND MANAGEMENT ASSISTANCE
   a. Remedial Oversight
   b. Enforcement Support
   c. Community Relations
   d. Data Management
   e. Analytical Support
   f. Other Technical Support

SOURCE: U.S. Environmental Protection Agency, from the ARCS Contractor Statement of Work.

While the trend is toward increasing the numbers of contracts and giving the regional offices more contracting control, the impetus for the changes differ among the component programs.

- In the remedial program, regional ARCS contracts, as discussed below, are phasing out national REM contracts. They will increase the number and total value of prime contracts and will constitute a layer of project management contractors between EPA and site cleanups. EPA has stated that the ARCS contracts are to improve competition and continuity in and provide performance based incentives for remedial contract work.
- The Superfund enforcement office changed its two national TES contracts ($57 million each) into eight, five-year TES contracts initially valued at $131 million each. The enforcement program claims that projected increased cleanups placed into that division, instead of fund-financed cleanups, will require more money. As of January 1989, six of the contracts were awarded (see table 3).
- The removal program has begun to add regional mini-ERCS contractors to its existing national zone ERCS contractors. An EPA IG report in 1987 on ERCS contractors found excessive costs being charged and suggested that lack of contractor competition was a reason. EPA responded in congressional hearings in April 1987 that the number of ERCS contractors would increase from four to 25 and that 17 of them would be selected that year. One year after the hearings, only eight had been selected for three of 10 regions. This reflects the administrative difficulties faced by EPA in attempting to spend appropriated funds. The total value of active ERCS contracts is about $500 million.

**Table 3.—New Technical Enforcement Support (TES) Contracts (as of January 1989)**

| Zone | EPA Regions | Contractors | Maximum Value ($ mil) | Contract Hours (1,000s) |
|---|---|---|---|---|
| One | 1,2 | Alliance Technology | 136 | 2,480 |
| | | CDM | 124 | 2,480 |
| Two | 3,4 | CDM | 118 | 2,480 |
| | | Dynamac | 107 | 2,480 |
| Three | 5,6,7 | (under negotiation) | | |
| Four | 8,9,10 | PRC | 117 | 2,480 |
| | | SAIC | 109 | 2,480 |
| Total value, $ mil | | | 711 | |

NOTE: TES Contractors support both Superfund and RCRA enforcement.
SOURCE: OTA from information supplied by EPA.

## Alternative Remedial Contracts Strategy

ARCS contracts, for the heart of the Superfund program--remedial cleanups--are new, major project management contracts. Therefore, OTA has examined ARCS contracts in greater detail to illustrate current contracting issues.

ARCS was preceded by the REM contracts started early in the program.[11] Under the REM system, seven national contracts have been awarded. The major REM contracts have been held by four firms: NUS Corp.; CDM; Ebasco Services, Inc.; and CH2M Hill. Total contract value through 1990 is $829 million. Two minority-owned contracting firms have also been awarded small REM contracts, totaling $42 million.

Organized by region or combination of regions (zones), ARCS contracts are expected to number many more than the old REM contracts, because of multiple contracts in regions or zones and the growth of Superfund.[12] Each contract will have a potential value of from $60 to $250 million, or more.

The ARCS contracts were designed to have wide ranging responsibility for the remedial phase of Superfund--from site studies to complete cleanup. The REM contractors were engaged for *individual*, discrete tasks, such as an Remedial Investigation/Feasibility Study (RIFS) or community relations plan, but not necessarily all tasks for a site. For specific sites, the ARCS contractors will: 1) manage site projects, 2) plan and design remedial actions, 3) implement remedial work, and 4) provide other technical and management assistance (see table 2). ARCS contracts, like REMs, will also oversee subcontractors who do pieces of the project work, a practice which is not necessarily ineffective or avoidable. However, the ARCS contractors are supposed to exercise much more control of subcontractors and have more responsibility for their technical work. This is a positive change.

J. Winston Porter, Assistant Administrator of EPA's Office of Solid Waste

11 The official name for REM contracts is: Enforcement and Remedial Planning Activities at Uncontrolled Hazardous Substance Disposal Sites.

12 Initially 30 to 40 contracts were planned; less will probably be awarded.

and Emergency Response, has described ARCS as a new initiative under a "speed the pace theme" for Superfund:

> ... We are looking at site cleanup from a 'project management' perspective. This approach should pay benefits through greater efficiency and accountability. Phases of the process such as developing the [RIFS], design engineering, and construction management could all be accomplished by one firm or organization with proven expertise in project management. Specialized work and opportunities for smaller businesses could be obtained through subcontract from the project management firm ... [13]

The project management approach, of which the ARCS forms the cornerstone, was laid out in an August 1987 memo by Porter. The memo identifies problems in the remedial program of pace, accountability, and continuity. But while the memo explicitly mentions timeliness 12 times, cleanup quality only appears twice. The memo begins, "The Administrator and I have made the completion of current projects *the highest near-term priority* within the Superfund program." Porter then discusses the existing system that "has involved a large number of pass-offs and downtimes, culminating in lengthy project execution periods." The memo concludes that "having so many organizations [REMs, the Corps and engineering firms, contract labs, EPA reviews] involved, we have had difficulty in fixing accountability and responsibility."

Porter states that the objective of the project management concept is: "... to have one management organization with overall day-to-day responsibility for the technical execution of the work." This project management organization would be under the direction of EPA's project manager, but EPA acknowledges that the ARCS contractor, *not EPA managers*, would be "accountable and responsible." Thus, from Porter's perspective, EPA's role is to overview, make fundamental decisions, and be the basic spokesman to the public, governments, and Congress.

According to another EPA document, "the ARCS concept is aimed at increasing competition, incentivizing [sic] performance, and promoting project continuity."[14] EPA has also described ARCS as further decentralization of program responsibility to EPA regions, as the contracts will be awarded and managed by regions, rather than by EPA headquarters.

Project management *in the public interest* by government workers is imperative for Superfund. Moving project management outside the government, however, adds another layer of contractors between EPA and the site problems the agency is charged with identifying and remediating. It avoids fixing a flaw in the current program: not enough internal EPA technical and project management expertise, even with extensive contractor support. Porter's memo (see above) laying out the project management concept recognizes this internal deficiency. He states, "I believe this [project management] concept also recognizes the fact that we will likely have difficulty in maintaining a large cadre of experienced engineering and construction managers in our organization." This is the crux of the issue.

But Porter says contractor project management organizations will eliminate EPA's *need* to "pull all the pieces together." In other words, contractors instead of government workers will manage contractors; contractors will manage projects instead of someone *in the government* managing the projects. The critical issue will

---

13 J. Winston Porter, U.S. Environmental Protection Agency, "Superfund Progress and Prospects," remarks prepared for delivery at the Hazardous Materials Control Research Institute Superfund '87 conference, Washington, DC, Nov. 16, 1987, p. 10.

14 "Superfund/RCRA Contracting," an undated EPA document given to OTA in late 1987, p. 1.

remain under ARCS: How will *EPA* ensure effective quality control of contractor work and consistency among contractors?

*Will ARCS Increase Competition?*

Whether ARCS will increase competition in the remedial program can be evaluated by answering two, related questions. First, has the system been opened up to a wider variety of contractors? And, second, do regional staff have a larger contracting pool from which to draw? OTA's review of the ARCS contracts awarded as of January 1989 shows that the system *is* pulling in some different regional contracting firms that were not visible under the REM system but the effective pool of contractors remains about the same as before.

In some regions EPA staff will have more *prime* contractors to call upon than they did under the REM contracting system. And, while increased numbers of prime contractors implies increased competition and perhaps more EPA control, it does not tell the whole story. Much of the remedial contract work to date has been performed by subcontractors rather than prime contractors. Thus, the real contracting pool under the REM system was as large as it will be under ARCS contracts if both prime and subcontractors are considered.

By January 1989, ARCS contracts had been awarded for Regions 1, 2, 3 and 5 and the zone comprising Regions 6, 7, and 8. Contracts for Region 4 and the zone for Regions 9 and 10 are still under negotiation and signed ARCS contracts are expected this year. Table 4 lists ARCS contracts awarded as of January 1989, including the prime contractors, team subcontractors, and the dollar value of the contracts. The 18 contracts awarded so far have a total potential value of $2.7 billion over 10 years (which is really a relatively small amount for the next 10 years of Superfund).

For the 18 new contracts, 13 firms were selected as primes (three firms won two each, and one firm won three). Of the 13 firms, 9 have had or have national Superfund contracts (four have had REM contracts). Of the 4 *new* firms in the system, 2 have teamed up with other firms (called *team subs*) that have had or have national Superfund contracts. OTA estimates that about 20 percent of the total money will go to firms new to the Superfund system (counting both primes and team subcontractors).

*Will ARCS's Performance Incentives Work?*

Competition on the basis of quality work *after* contracts have been awarded is more uncertain than competition *before* firms get the work. Incentive to perform well has been supposedly built into ARCS contracts through the awarding of multiple contractors by region and award fees. Thus, RPMs will ultimately be able to pick and choose among the available ARCS contractors, assuming that at any time there is significant unused contractor capacity. Judgments as to which ARCS contractors are performing better than others will take some time, and evaluations will be made prior to completion of major pieces of work (such as RIFSs which take at least a couple of years to complete or complete cleanups which take several more years). Meanwhile, EPA staff plans to evenly distribute work or to make judgements on the basis of their past experiences with the same contractors under the REM system or through personal knowledge.

Under the REM system, a judgement that a contractor was not performing well was difficult to substantiate bureaucratically. Although there are some very experienced and capable RPMs, all too frequently a relatively inexperienced, often young, RPM has to go up against experienced contractors. Even some experienced RPMs have found challenging a REM contractor a difficult and intimidating task. Contractors believe that

**Table 4.—Regional ARCS Contracts (signed as of January 1989)**

| Region | Prime Contractors | Maximum Value ($ mil) | Contract Hours (1,000s) | Team Subcontractors |
|---|---|---|---|---|
| One* | NUS | 146 | 300 | Badger, JHR |
| | Arthur D. Little | 69 | 145 | Remediation Tech, Havens & Emerson, Inc. |
| Two* | Ebasco Services | 223 | 560 | IT Corp., Wehran Eng, Hitman-Ebasco |
| | ICF Technology | 53 | 145 | Gibbs & Hill |
| Three | NUS | 216 | 560 | Gannett-Fleming |
| | Ecology & Environment | 53 | 145 | none |
| | CH2M Hill | 223 | 560 | none |
| | TetraTech | 65 | 145 | Wapora, GeoTrans |
| | Black & Veatch | 65 | 145 | EarthTech |
| Four* | | | | |
| Five | CH2M Hill | 227 | 560 | none |
| | Black & Veatch | 220 | 560 | Warzyn Engineering |
| | WW Engineering & Science | 58 | 145 | Limno Tech, Dr. J. Goodman, Alderink & Assoc. |
| | PRC | 212 | 560 | ICF, Versar |
| | Ecology & Environment | 61 | 145 | none |
| | Roy F. Weston | 222 | 560 | Dames & Moore, Engineers Intl., Life Systems, Hubble Roth Clark, Reed Quebe Allison Wilcox & Assoc. |
| | Donohue & Assoc. | 227 | 560 | Ebasco, STS Consultants, John Mathes Assoc., Life System/Icair |
| Six and Seven | CH2M Hill | 152 | 300 | none |
| | Jacobs Engineering | 150 | 300 | McClellands, Terracon |
| Eight, Nine, and Ten* | | | | |
| Total Value, $ mil | | 2,662 | | |

*Contracts still under negotiation.

SOURCE: OTA from information provided by EPA.

RPMs can and do give contractors critical evaluations. The ARCS system will not change the technical expertise level of RPMs, but the criteria for contractor managers is quite stringent and they are likely to be considerably older and more experienced than most RPMs. In fact, over time ARCS contracts could decrease RPM expertise relative to that of the contractors because ARCS puts great emphasis on contractor site managers, giving ARCS contractors increased importance. Unless there is substantial internal support for and reliance on RPM judgement, making a poor performance rating on ARCS contractors may be more difficult to accomplish--the stakes are higher under ARCS than the REM system. As a result, the project management concept could undermine independent government control of contract work *unless there is increased emphasis on EPA staffing needs.*

Underlying the whole notion that ARCS will breed competition *after firms win contracts* and lead to higher quality work, according to EPA, is that 50 percent excess aggregate capacity has been built into the contracts. EPA says, "This excess capacity is essential to the performance incentives in ARCS since contractors are not assured of receiving orders that will meet the full contract capacity."[15] But will this calculation over the 10-year life of ARCS contracts be accurate? Or, like previous contracting

15 J. Smith, et al., "ARCS: A Performance Based Strategy," Superfund '88 conference proceedings (Silver Spring, MD: Hazardous Materials Control Research Institute, November 1988). Although the lead author works for EPA, the other two authors of this paper which describes the design and operation of ARCS work for one of Superfund's major program support contractors. Of 36 presentations at Superfund '88 by EPA personnel, two-thirds were coauthored with contractors.

programs, will there be such a high demand by EPA for contractor work that essentially all ARCS contractors will receive the maximum and not the guaranteed minimum amount of work--perhaps long before 10 years? It would be very useful for EPA's IG to monitor the initial flow of work assignments to ARCS contractors during the next year or two to check this critical design feature of ARCS contracts.

Finally, the performance award fee system used in ARCS has been used in other major contracts and, based on our studies, has not resulted in a consistent high level of quality contractor work, although many observers think that there have been definite improvements over time. A November 1986 survey of six EPA regions found about one half of the 32 respondents (mostly RPMs) saying that the award fee approach was not effective.[16] Some specific comments were:

- "There are few, if any, incentives built into the REM contract that discourage the production of mediocre to low-quality documents. The award-fee is not an effective tool to correct problem areas in the RI/FS process; this has the potential to cause (and in several cases it actually has) project overruns."
- "Non-effective--the only meaning it has to the contractors is if it is not average or above. Dollar values are too small to be meaningful."
- "Not effective enough. The contract encourages mediocrity and not excellence."
- "It is not [effective]. It's just gravy to REM contractors already making too much money for low quality work. LOE (level of effort) contracts favor using as many hours as possible. No incentive to do good quality work at a reasonable cost."

Although, theoretically, better performance results in higher award fees, cost control objectives by contract managers may limit award incentives for improved work. Also, it should be noted that giving a contractor a low or a high performance rating, which EPA staff say has the most impact on contractors, requires considerable work by EPA staff. There is a built-in incentive to give contractors average or above average ratings. Also, there is considerable uncertainty from the contractor's perspective on how award fees will be decided, since so much depends on individual judgments by EPA staff.

*Will the Project Management Approach Assure Continuity?*

Project continuity as a site moves through remedial phases is an important goal and recognition of a lack of it in the program is commendable. But the ARCS solution may not help much.

There has been considerable attention under the REM system to delays caused by *handoffs*; that is, contractor changes between project phases. And when a new contractor lacks confidence in a previous contractor's work, these delays multiply. Since the ARCS contractors will be assigning the same discrete tasks among subcontractors, handoffs will still occur.

Another aspect of project continuity is people. One contract *firm* may have a site project management contract throughout a number of phases of a site project. But this does not guarantee that the same **people** will be involved or will manage the site through the period of the contract. First, as stated above, different subcontractors will be handling different phases of work. Second, EPA requires that senior key contractor personnel work on a contract for a minimum of 120 days. After this period many of these people are likely to be moved to other, probably newer, contracts to help win them. Third, given the high mobility of the Superfund workforce (driven by high demand) and the

16 U.S. Environmental Protection Agency, "RI/FS Improvement Analysis," contractor study by CDM, July 1987.

length of site projects, there is no reason to believe that, even within ARCS contractors, the managers and technical staffs will remain in place throughout the full cycle of site remediation--or even a significant fraction of it. And, it is **people**, not solely organizations, that provide institutional memory or continuity.[17] One major PRP has a policy of moving a project to the new firm when a key project manager moves there, something the government cannot do. Moreover, high turnover of EPA people means that project continuity is also jeopardized from the inside.

And, lastly, the project management concept is at risk because of the high overall cost of running a site project through the remedial planning, design, and implementation phases. The award levels of the ARCS contracts may not be large enough to cover that overall cost. For instance, the smaller contracts have maximum potential values around $60 million over 10 years. Turning over just three small sites could consume an entire ARCS contract. This phenomena is already causing one region to assign only RIFSs to ARCS contractors and to await knowledge of the cost of the cleanup before determining whether the ARCS contractors or the Corps of Engineers is assigned the actual remediation. In fact, it is our understanding that, in general, ARCS contractors may only handle the actual cleanup if estimated costs are below $5 million, leaving most cleanups contracted through the Corps of Engineers. This is the same process used under the old REM strategy. And, it illustrates the conflict between the project management and competition goals of ARCS. In order to award multiple contracts per region, individual ARCS contract values have been kept too low to accommodate the true cost of taking a significant number of sites through the entire process and to provide 50 percent excess capacity.

*Will Decentralizing Contracting to Regions Improve Management?*

On the face of it, giving regions greater control over the contractors who do their work seems efficient and appropriate. It assumes, however, that the expertise to select, negotiate with, and manage contractors is available in the regions. Regional staff will not only have to be able to make technical judgements of contractor performance but also administer increased numbers of higher value contracts. Not only will technical and administrative expertise be required at the regional level but decentralizing to regions will also mean added regional costs.

Does significant management expertise to manage the ARCS exist in EPA regions? Regions have been responsible for managing State cooperative agreements, and in a capping report on State cooperative agreements in 1988, EPA's IG concluded that EPA regions have not been effective managers of State contracts. States have been allowed to fall behind on schedules and not reach goals or objectives. States have been experiencing "significant problems completing [RIFSs]." And, monitoring of State pre-remedial work has been inadequate. The IG found "widespread noncompliance with procurement requirements" by States, which means that States were not adhering to Federal standards in awarding Superfund contracts.

17 Some contractors are saying that the turnover of key site project management people is really not that important. But site evaluations and cleanups seem to fit a fundamental category of effort--project based--which has always been recognized to require stable direction over reasonably long periods. Like making motion pictures, constructing large buildings, or performing technology assessments, cleaning up toxic waste sites will be more efficient if the same people are in charge from beginning to end.

Overall, the IG said, "Regions were not effectively performing their oversight responsibilities."[18]

Additional evidence of regional shortcomings comes from another IG report which concluded:

> Contracting methods ... did not follow established Agency procurement policies and procedures. Also, EPA personnel allowed contractors to start work prior (up to 8 months) to signing delivery orders and did not subject the technology manufacturers to the normal competitive bidding process.[19]

EPA Administrator Lee Thomas told Congress in April 1987 that expanding competition in contracting services would require increased numbers of contract managers. Referring to removal staff, he said, "We will double the number of contract managers we have on that staff to look at those projects, oversee those projects, from a financial management point of view this year."[20] Doubling contract managers for new removal contracts and doubling contract managers for new remedial contracts will double the cost of administering contracts. But, as noted earlier, as a result of congressional action, there will be no real increase for EPA's spending on the administration of Superfund.

---

18 U.S. Environmental Protection Agency, Office of Inspector General, "'Capping Report' on EPA, Office of the Inspector General, Audits of Superfund Cooperative Agreements for Fiscal Years 1985 through 1987," March 29, 1988, p. 4.

19 U.S. Environmental Protection Agency, Office of Inspector General, "Review of Region 4's Management of Significant Superfund Removal Actions," September 1988, p. 6.

20 U.S. Congress, Superfund Implementation, S. Hrg. 100-261, hearings before the Senate Subcommittee on Superfund and Environmental Oversight of the Committee on Environment and Public Works, April 14, 1987, p. 150.

## Second Key Issue:
## Why Depend On Contracting To Such A Great Extent?

Originally, there was congressional concern that Superfund could become a large, unwieldy public works program. Inexperience with uncontrolled hazardous waste sites in 1980, as well as the desire to get a quick start, also fed into the contracting policy decision. Embedded in the statute was also a heavy responsibility for government to identify responsible parties and seek private cleanups and cost recovery for government-funded cleanups.

In 1980, many people thought that cleaning up uncontrolled hazardous waste sites was a short-term problem, to be solved relatively quickly with known engineering techniques. A short-term program had no need for a huge internal government bureaucracy that would gain a life of its own, and Congress wanted the money to be spent on cleaning up sites instead of building a bureaucracy. Also, EPA--a regulatory agency--had no expertise in running a major operational, engineering program. There was, as well, a crisis atmosphere. Congress and EPA assumed that contracting would enable EPA to get the program started faster than if the agency had to first develop internal structure and expertise. These congressional concerns and actions, aided by the Reagan administration's policy to accelerate the privatization of the Federal Government, have led to the current large scale dependence on contractors in the Superfund program.

Regarding its contracting policy and how it came about, EPA told OTA:

> ...The real deciding factor on how to effectively operate and manage the Superfund program was made early in the program and is a result of both Congressional intent and Agency management decisions. Congress envisioned the program to be overseen and managed by the Agency. Agency managers set up the current structure as the most *cost effective and efficient*.
>
> ...The restriction is an end result of the budget development process and is included in the Superfund appropriation as an assurance to Congress that *resources provided will be expended on site cleanup and related activities*.
>
> The Agency believes that *management and oversight* of the cleanup of abandoned hazardous waste sites *is a prudent and appropriate role*. The structure necessary to establish a major construction workforce in EPA for Superfund site work would exceed the role intended by Congress for the Agency and would unnecessarily duplicate services readily available in the public sector [emphasis added].[21]

The relative merits of contracting out versus the use of in-house government staff is an old issue, the pros and cons of which will not be extensively explored here.[22] But, the points usually debated--whether contracting out is cost effective and efficient, results in quality work, and is appropriate for the government activity being contracted out--are questions that Congress might ask of the Superfund program. These are the same questions Congress has been asking about government defense programs. The key issue is the *extent* of contracting and particularly its growth versus building an effec-

21 U.S. Environmental Protection Agency response to an OTA letter, Sept. 29, 1987.

22 For a quick review of the issue, see U. S. Congress, Congressional Research Service, "Contracting Out: Some Basic Policy Questions for the DOD and Other Government Agencies," Report No. 83-142 F, Sept. 19, 1983.

tive government workforce to ensure that contractors provide high quality and cost-effective services.

What was a reasonable policy decision eight years ago may not make as much sense today. First, the Superfund program and related cleanup programs are and will not be short-term Federal programs whose problems can be easily solved. Second, large scale contracting under Superfund has not necessarily been--nor has any attempt been made to show that it is--cost effective and efficient, and it has not yet assured that funds are "expended on site cleanup and related activities," as EPA states above. Third, contracting has not avoided the development of dependent bureaucracies. Fourth, emphasis on contract management does not lead to the development of an infrastructure and technical capability that drives EPA up the learning curve. Fifth, the large pool of contracting money creates a pulling force on personnel--out of the Federal (and State) system and into the private sector. And, sixth, Superfund contracting contains a potential for conflict between public and private interests.

There has been little reconsideration of the immediacy of environmental threats from most Superfund sites. If there is, in fact, not a crisis situation to deal with (only a tiny fraction of Superfund's resources are spent on true emergency situations), then a slower pace of spending on contracting could be justified.

But, as we have shown, the trend is toward increased funding for contracting; sometimes, not intentionally. For instance, the imposition of mandated schedules for attaining certain levels of activities has also contributed to increased dependence on contractors. The policy of mandated schedules was a reaction to a slow program, but Congress gave little consideration to who would do the work and whether the requirements might worsen an already heavy workload for a largely inexperienced contractor and EPA workforce.

# Third Key Issue:
# Is the Extent of Superfund's Dependence on Contracting Appropriate?

Do the functions of the Superfund program fit traditional criteria for appropriate contracting out? Is the large scale dependence on contractors an appropriate way to manage a long-term, probably 50-year, cleanup program which will span a number of career lifetimes? Or, could the government workforce itself conduct more Superfund work? The latter is an important policy option today.

## Superfund Activities and Contracting

Superfund program activities can be broken down into six categories: policy development, regulation development and enforcement, program oversight and management, information collection, site analysis, and the physical work of cleanup. All are contracted out in varying degrees, even oversight and management which EPA claims is the most appropriate role for the agency. Contracting of project management is due to increase under the ARCS system and oversight of PRP (potentially responsible party) takeovers is routinely contracted out (as was suggested by Congress in Section 104(a)(1) of CERCLA).

Federal rules for contracting are issued by Office of Management and Budget (OMB). OMB has exempted, as inappropriate for contracting out, activities that are "inherently governmental" because they are:

> ... intimately related to the public interest ... These functions include those activities which require either the exercise of discretion in applying Government authority or the use of value judgement in making decisions for the Government.[23]

And GAO has said:

> ... a key consideration in evaluating any function [for contracting] is whether its performance by an outside contractor interfers with an agency's control of policy, decision-making, or managerial function which are basic to its mission.[24]

Using the GAO's criteria, each Superfund activity can be evaluated separately. Testing and information collection at sites and actual physical cleanup work appear to be most appropriate activities for contracting out.

The areas of policy, regulation, management, and oversight have the attributes GAO cited and seem the least appropriate activities for contracting out. EPA officials maintain that contractors do not make policy, but if contractors provide virtually all the information and analyses, have staff

---

23 Office of Management and Budget, Circular A-76 (revised), op. cit. Circular A-76 covers commercial/industrial services; Circular A-120 covers consulting services.

24 U.S. Congress, Senate Committee on Veterans' Affairs. Oversight on Issues Related to OMB Circular A-76. Hearings, 97th Congress, 1st Session, Nov. 5, 1981, p. 118.

more experienced than EPA, and write key initial drafts, there is certainly a lot of opportunity for contractors to shape policies. Indeed, OTA has examined a number of contractor studies which later became the basis for program policies, including work done to revise the RIFS process and the preremedial process.[25]

Site analysis, as well as physical site cleanup, is technical in nature. But site analysis leads to critical policy decisions, such as whether a site does in fact require cleaning up or whether the Federal system will pay for the cleanup. Thus, using GAO criteria, not all steps in the initial site analysis phase may be appropriate for contracting out. Records of Decision (RODs) are probably an example of an inappropriate step. The ROD incorporates not only technical analysis but embodies policy decisions and has a legal bearing on EPA's ability to recover costs under the enforcement provisions of CERCLA.

Overall, few nonfield, report producing Superfund activities appear **eminently** appropriate for contracting out. The most appropriate Superfund activities to contract out--the physical examination, testing, and remediation of sites--are the most expensive, but so far most of the work has **not** been actual remediation. (This will change as the program matures.) As of June 1988, 103 sites were at the remedial action stage whereas 641 were still undergoing RIFSs. Under current policy, with only 13 percent of the budget in fiscal year 1989 to be spent internally, *all* of that critical analysis on over 600 sites will be done by contractors.

## Needed: Independent Contractor Work and Independent Government Capability

When communities, PRPs, OTA, and other groups have raised questions about contractor work at specific sites, EPA has often paid more money either to the original contractor to reexamine the work or to another contractor to repeat the work. Although there are some very experienced and expert staff in EPA, for the most part there is very little internal government capability, both expertise and time, to *independently* check contested contractor work.

Another issue is that the same contractors who do the policy and program support work also do the field engineering work. Does this practice encourage fresh thinking and critical analysis of past work to develop more effective policies? The good side of this practice is that the contractors bring to the policy and program support area real world experience. But the other side is that EPA is not getting independent evaluations of the work of the contractors who are implementing the program. Often EPA hires a contractor that is implementing a technical task for the program to discuss how to improve that task and to suggest policy changes. One of EPA's major contractors in the policy and management area, who has played a key role in the development of Superfund, has now branched out; most of its major recent growth has been from winning engineering and project management ARCS contracts to implement the programs it helped create. Did it have a special competitive advantage?[26]

---

25 See OTA's testimony, hearing before Subcommittee on Superfund and Environmental Oversight, Senate Committee on Environment and Public Works, Dec. 10, 1987. Two contractor reports were discussed: "RI/FS Improvement Analysis," by CDM, July 1987, and "Workload and Resource Requirements for Preliminary Assessments, Site Inspections, and Hazard Ranking System Evaluations Under SARA," by Ecology and Environment, October 1987. OTA said, "[EPA] could use management consultants or other experts who are not now implementing its programs and who, therefore, may be able to offer more objective ways to improve efficiency."

26 The contractor states its position in one of its advertisements: "By building our engineering work on a solid foundation of regulatory know-how, ICF is qualified like no other firm to provide you with the most comprehensive hazardous and mixed waste management services in the nation. Unlike other firms, we understand not only the technical engineering and remediation aspects of hazardous waste management, but also the framework of regulatory requirements, enforcement, and public involvement in which our clients must operate."

It is not enough that government workers retain final decisionmaking authority unless those government workers have the time, experience, and technical expertise to understand and evaluate what contractors are telling them, as well as create the key basic ideas in the first place. That is, **there is a difference between contractors complementing or supplementing government staff and contractors replacing government staff.** In box B are brief examples, from several contract statements of work, to illustrate current Superfund program support and policy-related work performed by contractors. These seem the kind of activities that people expect government workers to do; some redundancy is also illustrated.

## Superfund: Five Years? Twenty Years? Or, More?

Today, few people consider the Superfund program to be one with an early sunset. Simple mathematics confirms that, using the most conservative number of sites to be cleaned up of 2,000 and an optimistic pace of 30 cleanups per year, the Superfund program will be around for the next 60 years (until 2050). Moreover, the cleanup programs outside of Superfund (e.g., EPA's RCRA corrective action program and those in the Department of Defense and Department of Energy) are growing rapidly and they compete for the same workforce.

Given the prospect of a long-term program, the policy question becomes: What kind of infrastructure should EPA be developing to insure institutional movement up a learning curve to bring the program into cost-effective and efficient operation? It is one thing for contractors to gather data on site contamination and implement government cleanup decisions. However, in a number of site case studies, OTA has seen evidence that contractors sometimes explicitly or in a de facto sense decide what sites pose significant enough threats to warrant cleanup, what the cleanup goals should be, what the community should be told, what the most feasible remedies are, whether the field work is of sufficiently high quality, and when the cleanup has met its goals. For these critical activities, a lot of judgment is necessary because technical data cannot simply be plugged into equations to get the right answer.

Over the long term, OTA believes that the Nation would be better served by an experienced, competent *technical* government staff to design, closely supervise, and evaluate the field technical services provided by contractors. This is the critical need, more so than a cadre of government contract managers. But, contract managers is what EPA is focusing attention on.

## BOX B.--Examples of Tasks in Current Policy Support Contracts

**Booz Allen and Hamilton, "Support for Superfund Implementation and Evaluation" (contract 68-01-7376, $21.7 million):**

- perform quarterly monitoring and evaluation of system operations and procedures
- conduct reviews of and develop recommendations on the regional management of the ERCS and TAT contracts
- evaluate environmental results achieved by the removal program
- conduct workforce and training need surveys and assessments
- collect and analyze information, develop reports and briefings on a variety of new emerging waste management technologies and innovations; recommendations shall be required on how to best make such information readily available to program personnel as they plan and implement cleanup objectives
- develop new policies and procedures to provide sound financial management and oversight toward the success of the Superfund program
- define requirements for planning and tracking of program strategic objectives, milestones and accomplishments
- define information needs, identify data sources and develop guidelines for source data collection
- develop issue papers, management briefings, user briefings and Headquarters-regional communications
- determine if [office] technology transfer activities are effective as developed by the program and whether, given the level of resources devoted to this effort, such a program can fulfill the need

**CH2M Hill, "Technical Support for Superfund Policy Formulation" (contract 68-W8-0098, $12.7 million):**

- provide technical support and recommendations to EPA on management of Superfund construction
- perform investigation of and make recommendations for assisting minority, small business, other contractors, and subcontractors in the Superfund program

**ICF, "Policy/Analytic Support for Superfund Implementation" (contract 68-01-7389, $11.3 million):**

- analyze statutory provisions to determine the need for new regulations, changes to existing regulations (i.e., NCP), new policy, and new guidance
- [for NCP] prepare regulatory impact analyses and regulatory flexibility analyses
- analyze SITE program issues and results and make policy recommendations
- develop methods for technology transfer

**ICF, "Analytical, Technical and Management Services for OSWER" (contract 68-01-7481, $$7 million):**

- collect and analyze data and information, develop reports and brief the technology transfer committee on a variety of new emerging technologies and innovations; recommendations shall be required on how to best make such information readily available to program personnel, including the Regions and States
- develop improved techniques for measuring performance
- analyze design, develop and implement selected training in critical content areas
- estimate the economic, social, and environmental costs and benefits of actual or proposed environmental regulations or policies on industry and government
- locate qualified experts
- assist in evaluating the economic and technical feasibility of various alternative technologies

## Fourth Key Issue:

# Does the Extent of Superfund's Dependence On Contracting Reduce Environmental Effectiveness?

Quality in the Superfund program is--or should be--measured by the environmental effectiveness of cleanup decisions and field actions. Reliance on contractors to perform the bulk of Superfund work exerts a number of forces on the program that sometimes jeopardizes the quality of that work. Among those forces are:

- the lack of development of internal EPA expertise, which results in poor contract management and oversight;
- more interest in controlling contractor costs than concern about the environmental performance of contractors;
- a mobile workforce whose perspective on quality, needs, and accountability can shift as it moves from the government--a purchaser of services--to and among contractors--a seller of services; and
- conflicts of interest that arise because working for the government may affect future work in the private sector.

### Technical Problems

OTA has illustrated quality problems, such as technical mistakes, use of inaccurate data, and poor quality control in its June 1988 report *Are We Cleaning Up? - 10 Superfund Case Studies*. GAO also noted problems with contractor performance in 51 percent of the cases they examined.[27] The OTA finding that there were substantial problems in the key RODs for sites (which are based in large measure on contractor studies and which are frequently drafted by contractors) was also found in another recent study, which said "... some RODs are simply deficient, lacking clarity, pertinent text, or substantive information."[28] Problems with RODs are also a reflection of high workloads and inexperience of EPA staff, particularly RPMs.

A recent survey of EPA's SITE cleanup technology demonstration program found that:

> Nearly one-third of the interviewed company officials [28 technology developers] claimed that the contractors hired by EPA to sample, test, and analyze data were unsatisfactory. ... Some industry representatives felt the contractors were slow, inexperienced, and generated irrelevant data. ... One official commented that contractors continue to analyze and re-analyze the same data, making more money for themselves and taking away dollars from both industry and EPA.[29]

Of the five technology companies that had completed their demonstrations, four had problems with EPA's contractors that prompted the study to note, "future demonstrations may be hindered unless the contracting system is improved in the future." Out of seven impediments to program performance and progress, contractors were the third most important to industry people in the program. But, "not one EPA official cited problems with the contractors." The

27 U.S. Congress, General Accounting Office, Superfund Contracts - EPA Needs to Control Contractor Costs, RCED-88-182, (Gaithersburg, MD: General Accounting Office, July 1988).

28 C. F. Baies III and G. Marland, "Evaluation of Cleanup Levels for Remedial Action at CERCLA Sites Based on a Review of EPA Records of Decision," Oak Ridge National Lab., January 1989.

29 J. Calarese, et al., "An Evaluation of the EPA Site Demonstration Program," Worcester Polytechnic Institute, Washington, DC Project Center, December 1988.

technology developers also expressed some views on contractors implementing Superfund's remedial program; one said "contractors tend to overcharge the EPA because [in his view] they have the power to do so." Another said that "tax payers are wasting their money in supplying money for consultants who are inept and take too long."

The Hazardous Waste Treatment Council has said of Superfund:

> For the first four or five years, it accomplished absolutely nothing except creating a huge new industry of environmental consultants who put that $1.5 billion into their pockets by studying sites, taking literally years to figure out what the site is like and what kind of remedies might be used. ... It is time to actually put remedies into place--to do the clean-ups.[30]

A member of the Remedial Contractors Council, a trade association formed in 1987, in explaining the group's purpose, said "We wanted to clean up the industry. There are dirt contractors out there who see good money in remedial work but don't perform properly with the proper safety. That gives the whole industry a black eye."[31]

An experienced PRP has written to OTA about a case in which a contractor that had only worked for EPA was hired to perform the RIFS for a groups of PRPs:

> The draft reports we received from the contractor were unacceptable by any engineering standards. [The contractor] assured us that these documents were identical to drafts acceptable to the EPA at other sites.

OTA has examined a number of very lengthy critiques of EPA studies by PRPs or their contractors; these are as critical of the poor technical work being done for the government as was OTA's June 1988 study and a study by several environmental groups and a trade association.[32] For example, work done on the Pristine Superfund site in Ohio for responsible parties independently confirmed problems in the FS study identified by OTA.

Critical studies and protests have not, however, resulted in EPA publicly acknowledging poor contractor work. No information seems to be collected to discover the extent of poor quality work (e.g., studies and cleanups that have to be repeated), and there is no evidence that any Superfund contractor has suffered significantly because of poor quality work. Again, rapidly rising demand by government and private parties relative to supply reduces the likelihood of firms being significantly harmed by poor quality work. This situation undermines the belief of some people that an effective incentive for improving contractor quality is a loss of reputation and business because of poor quality work. Conversely, a cut in Superfund spending on contractors, coupled with improved and expanded EPA staffing, could correct this market.

## Examples of Contractor Issues

Following are several examples of contractor issues and problems in Superfund which affect environmental performance of the program.

### *The Hazard Ranking System*

One firm--Mitre--has always held the contract covering the Hazard Ranking System (HRS). Mitre developed the original HRS early in the program, has always run the quality assurance (QA) program for all HRS scores that determines whether sites qualify for remedial cleanups in the Federal Superfund program, and since its reauthorization

30 David Case, cited in Breaking the Environmental Gridlock, Eagleton Institute of Politics, Rutgers, 1988.

31 "Superfund Contractors Unite in RCC," Waste Age, October 1988.

32 Environmental Defense Fund, et al., Right Train, Wrong Track: Failed Leadership in the Superfund Cleanup Program, June 20, 1988.

(1985 through 1989). Yet last March the EPA IG's office commented on this central, nationwide quality assurance program:

> We recommended that the Headquarters HRS scoring quality assurance process needed to be improved, because of the inconsistent application of the HRS process noted in our audits. The Agency's response did not address the concern, but merely reemphasized its existing quality assurance process, which in our opinion, has not adequately ensured the consistency and accuracy of the HRS scoring packages.

OTA received from EPA the database for all HRS scores. OTA has examined the fundamental technical aspects of the HRS approach, and we are also interested in how it is being implemented. When we examined the data for 2,026 sites, we found some surprising and serious errors. For example, we found 12 sites with scores listed as less than 28.50 that our arithmetic check showed to actually be above this cutoff score, which would put them on the National Priorities List (NPL). When we asked EPA about this we were told that many of the data we had been given were for sites that had not completed the QA process and checking for arithmetic errors is done last. This seems a weakness in the QA process because sites with scores less than 25.0 (for whatever reason) do not move to the QA stage, a precursor step to placement on the NPL. Because of our inquiry, a computer search for arithmetic errors was done for all the sites in the database and many errors, including the ones we had found, were discovered by EPA. In fact, the scores of 17 percent of the sites, which had not previously been checked for accuracy, were wrong. To reiterate, the point is that many sites and their scores may never reach this stage because their calculated scores are too low and EPA regional offices drop them from further consideration.

The 17 percent figure for errors shows that the original quality control processes carried out by contractors and regional staff appear ineffective in eliminating simple arithmetic errors. **It is possible that hundreds of sites, which have never entered the HRS database and quality assurance system and which may actually require cleanup, have been dropped from the Superfund system because of undetected mistakes in scoring them.** This is aside from much more complicated technical problems in applying the HRS. At present, there is not much of a safety net in catching such *false negative* sites, because only a few States have enough resources to systematically check out sites dropped from EPA's system.

*The Iron Mountain Mines Site*

At the Iron Mountain Mines Superfund site in California, the responsible party has written EPA about actions by contractor personnel (under the direction of CH2M Hill, the REM contractor) *during cleanup* which are resulting in extensive migration of hazardous substances offsite. The problems are said to result from the contractors "not understanding the heavy rainfall conditions at this site" and from "EPA's neglect and poor supervision of its contractors at this site." It is also alleged that the contractors "are being allowed to make unjustified profits at taxpayers and [responsible party's] expense."[33]

*The Old Springfield Landfill*

The June 1988 Feasibility Study (FS) for the Old Springfield Landfill site in Vermont was done by ICF Inc. for Ebasco Services Inc., the prime REM III contractor. The estimated cost for the onsite, mobile incineration option covered several scenarios based on achieving different risk levels by excavating different volumes of hazardous waste. However, the contractor used the same unit

33 Iron Mountain Mines, Inc., letter to U.S. Environmental Protection Agency, Region 9, Nov. 28, 1988.

cost of $600 per cubic yard for mobile incineration over the range of 5,300 to 142,000 cubic yards. First, the FS ignored the fundamental engineering principle of economy of scale, which would have reduced unit cost as the volume increased, something commonly done by Superfund contractors. It is like estimating the cost of aircraft without taking into account how many planes would be manufactured and using the cost of making a few planes when, in fact, hundreds would be made.

Second, *actual* prices now being paid by EPA for mobile incineration are much lower than $600. For example, for the Prentiss Creosote site in Mississippi, EPA contracted for a cleanup of about 8,500 cubic yards at an average cost of about $340 per cubic yard. For 142,000 cubic yards the unit cost might be as low as $150 per cubic yard. If it were, then the cost of the cleanup alternative offering maximum environmental protection would be $78 million instead of the $199 million figure obtained by the contractor.[34]

Moreover, in the same FS costs for the other major treatment alternative, in situ vitrification (ISV), were probably over estimated, although costs for this technology are more uncertain than for incineration. Two recent FSs (Pristine and Goodrich/Airco sites) used unit costs of $290 per cubic yard and $275 per cubic yard; a recent technical paper cited $243 per cubic yard.[35] The Old Springfield FS used values ranging from $447 to $526 per cubic yard but not with a systematic dependence on volume to be treated. If a value of $243 per cubic yard is used, which seems reasonable for the high volume scenario, then the estimated cost of ISV is $72 million instead of the $128 million obtained by the contractor and used by EPA. This situation also illustrates the need for EPA to keep a central data file and to disseminate it to the contractor community. For ISV there is, in fact, only one company and one source of information on the technology and its cost.

In this example, the costs of waste treatment technologies were systematically over estimated relative to the chosen land disposal option which was estimated to cost $13 million.[36] The point here is **not** that a treatment approach in the range of $72 million to $78 million is necessarily the best way to go, but to point out that better site study work **might** have affected the cleanup decisions. Where was the quality control in ICF, in Ebasco, and in EPA? Even a cursory reading of the FS by an engineer could detect the lack of using economy of scale costing for the incineration option. Would the local community have found it useful to have seen more accurate cost estimates of the treatment alternatives during the public comment period?

This site and many others (possibly hundreds) illustrate a larger problem: was such a complex and costly FS really necessary at all? This site appears to fit a category of large, closed, and older landfills containing mostly nonhazardous waste for which the capping cleanup approach is **routinely** selected by EPA. If so, then why spend a lot of money on contractors studying alternatives? In most of these cases hardly anyone would find spending the very large amounts of money for excavation and treatment warranted environmentally or cost effective.

---

34 The point here is not the precision of the estimate of $78 million but that there is a very large overestimate given by the $199 million figure and that this latter figure is inconsistent with many data available to contractor and EPA personnel. EPA used $199 million in the analysis that rejected incineration in favor of traditional consolidation, landfilling, and capping of the waste at $13 million.

35 N. J. Sell, Pollution Engineering, August 1988.

36 Hazardous Waste Treatment Council, proceedings of RCRA/SARA 1988 conference, Washington, DC, October 1988. The Hazardous Waste Treatment Council has said, "The cost of technology-based remedies is often cited, but HWTC has found that costs are often wildly over-estimated in RI/FSs ..."

But should capping be considered the permanent solution or an interim control approach? Should there be more explicit commitment to testing for hot spots of contamination and finding lower cost treatment technologies which detoxify the buried hazardous materials?

## Supply and Demand

Capping the administrative expenses of the Superfund program has prevented the growth of a huge government bureaucracy. In 1986 EPA had 2,156 technical employees working full or part time on Superfund (in government parlance, 1,116 full time equivalents, or FTEs). The ratio of FTEs to the program's administrative budget has remained fairly constant since 1982, while the ratio of FTEs to the full budget has declined. This has two effects on the program: 1) there are fewer EPA staff to manage more contract work, and 2) the growth of a large internal bureaucracy has been prevented.

The shortage of trained EPA personnel for remedial cleanup has been the subject of many congressional hearings and several GAO studies. GAO reported in 1986, that Superfund staff believed that about 600 new employees were required to meet program needs, estimating the program to be 36 percent understaffed at that time.[37] The high turnover of personnel, one of the causes of understaffing, robs the program of an ability to develop a sufficient, experienced core technical staff. **The lack of a stable core of expertise prevents the program from attaining a high level of efficiency and from routinely making sound, consistent environmental decisions.**

One reason for the staff shortage is simple economics, the laws of supply and demand. There is evidence of a direct relationship between the initiation of Superfund contracts and EPA turnover. EPA Region 2 has told OTA that once new TES and ARCS contracts are signed they expect to lose 20 percent of their Superfund staff. Congress and EPA, by creating an ever growing marketplace for contractors, has also created a demand for personnel **outside** the government. And, outside demand increases as the Superfund contracting budget increases. Lee Thomas, EPA Administrator, said that the public would see continued growth of the contract industry as a result of the passage of SARA.[38]

The growth of contractor work and the demand it creates drains EPA of its personnel just as they begin to develop some expertise. It turns EPA into a personnel training ground for contractors and forces EPA to compete with contractors in hiring replacement employees. Consequently, EPA has had to hire staff right out of universities for unusually responsible jobs, such as RPMs. Even at that level EPA faces strong competition from the contracting industry. Consulting companies may pay about twice as much as the government in recruiting engineers out of school at the bachelors level. Some RPMs have been hired without technical academic backgrounds.

A study for the Appropriations Committee of the House of Representatives said, "many of EPA's project managers were

37 U.S. General Accounting Office, Superfund: Improvements Needed in Workforce Management, GAO/RCED-88-1 (Gaithersburg, MD: U.S. General Accounting Office, October 1987).

38 Inside EPA, Jan. 30, 1987.

recent college graduates and were lacking in any real project management experience."[39]

After an extensive U.S. tour, a West German analyst made some insightful remarks about the Superfund program and staffing problems:

> I met the youngest people in the agencies ... some of the technical and procedural problems the agencies had and still have in implementing the cleanup program are due to this staff-situation ... Often it is their first environmental job ... after a couple of years they are well-trained and capable of solving any other problem. You see a lot of them turning over [to] private industry.[40]

As a training ground, EPA not only provides a person with some technical knowledge but, perhaps more importantly for contractors, also internal working knowledge of EPA procedures, the agency's strengths and weaknesses. That knowledge can be invaluable to a contractor already working for EPA or trying to secure work with EPA or PRPs or to a PRP who is negotiating with EPA over site cleanup.

Many senior EPA officials go directly into senior management positions with contractor firms at higher salaries. Even at lower professional levels there is evidence of high rates of turnover of key EPA technical staff to jobs with contractors at higher salaries. GAO estimated that in 1986 Superfund employees leaving the program received an average salary increase of $7,200 annually.

The money gap may be wider now. One EPA region has told OTA that in 1988 they lost 27 percent of their On Scene Coordinators in the removal program; all left for higher salaries, with one receiving a $20,000 pay increase and a company car. One contractor has told OTA that technical people, such as experienced RPMs, could get as much as $70,000 in this firm.

Preliminary analysis of data being collected by OTA (see figure 2) shows that generally the majority of RPM positions--perhaps the most critical technical positions in Superfund with responsibility for multimillion dollar contracts at several sites--pay about $30,000 to $40,000 annually (somewhat more with overtime). And some RPM positions are staffed by relatively junior personnel at the $15,000 to $25,000 level. In some EPA regions, the fraction of these lower paid RPMs is substantial and sometimes results (e.g., Region 9) because of general limits on funds and positions for EPA staff, not a lack of desire to hire more senior people.

Comprehensive data on turnover rates for the whole Superfund program is sketchy. Part of the problem is that EPA does not keep employment statistics by job title but, rather, by professional discipline. And, although some regions may have worse problems in keeping staff than others, no one denies that the Superfund program has a problem in retaining staff. GAO stated that:

> Several critical Superfund occupations had quit rates two to six times higher [in fiscal year 1986] than the average for similar federal jobs ... Most EPA managers GAO interviewed expected the private sector to lure even more employees away from Superfund. GAO's survey showed that over one-third of Superfund employees planned to look for other jobs in 1987.[41]

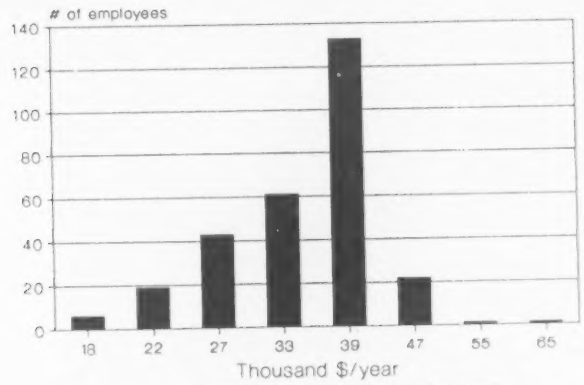
---

39 Surveys and Investigations Staff, A Report to the Committee on Appropriations, U.S. House of Representatives, on the Status of The Environmental Protection Agency's Superfund Program, March 1988.

40 Gunther Bachmann, "Soil Cleanup Policy in the USA," July 1988, p. 31.

41 U.S. Congress, General Accounting Office Superfund Improvements Needed in Work Force Management, op. cit., p. 4.

Figure 2
RPM Salary Distribution




Source: OTA data from all EPA regions except Region 5.

Note: Salaries estimated at the mid-step of the corresponding federal grade level. Lower level salaries may be over estimated because professional employees at those levels are generally promoted to the next grade prior to reaching mid-step.

One of the first senior managers of Superfund, Ken Biglane, explained the movement of enthusiastic professionals out of the program to contractors: "They're getting paid good salaries for a whole lot less grief." And he described the impact of the loss of people as "sapping the leadership in government in the environmental area."[42]

For the removal program, EPA's IG found in one of its audits that there was "excessive turnover in Technical Assistance Team staff, resulting in high travel costs, and TAT assistance being provided by personnel inexperienced at the site."[43]

The problem is not just lower pay. The GAO report said that better advancement opportunities is the major reason that EPA personnel leave the Superfund program. Other reasons include "dissatisfaction with regional management, salaries, and use of employees' technical skills and disillusionment with clean-up progress."[44] **RPMs also have high workloads, little support, and low morale because their initial high expectations to help solve a serious environmental problem cannot be met.** The large scale dependence on contractors in the Superfund program creates enormous opportunities for government workers to get a lot more money to use their *technical* skills because contractors face a supply problem for experienced technical workers.

When addressing the movement of people from EPA to Superfund contractors it is possible to come to an inaccurate view of the complex national system. Although significant numbers of EPA staff are moving to contractors and EPA does serve as a training ground for contractors, most of the large increases in contractor staff are coming from other sources. These include recent college graduates and people who have worked in other environmental or nonenvironmental

42 Judy Fahys, "Ken Biglane," Hazmat World, August 1988.

43 U.S. Environment Protection Agency, Office of Inspector General, Annual Superfund Report to the Congress for Fiscal 1987, September 1988.

44 Ibid., p. 4.

fields. The large majority of people entering the rapidly growing contractor workforce do not have the kind of cleanup experience that can be obtained by some people at EPA, particularly RPMs. Moreover, growth of the contractor industry has not been stopped by the talent squeeze even though, as one analyst of the contractor industry said, "The greatest constraint to growth in the environmental consulting and engineering business is the very limited availability of experienced professionals."[45]

In assessing the possible impact of SARA at a National Association of Manufacturers meeting in 1986, one speaker claimed that "there just aren't enough experienced people to do what EPA is being told to do" and that with experienced people in short supply industry will be able to pay higher salaries than government, keeping talented people out of government service.[46]

And, prospects for the future are not good. GAO, in discussing EPA management challenges said recently:

> EPA, like other agencies heavily involved in research, can expect *increased* difficulties in competing for top scientific talent against private sector organizations [emphasis added].[47]

This supply-demand problem can be attacked on two fronts: 1) reduce demand by contractors for experienced and inexperienced people, and 2) improve the supply by expanding national education and training and by making working for EPA more attractive, fulfilling, and rewarding.[48]

## Infrastructure Development

In the Superfund program solid technical expertise is developed by the people collecting the data for Remedial Investigations and analyzing data for Feasibility Studies and by those actually cleaning up sites. These jobs are done by contracting staff, not EPA personnel. Because of the pull of the contractors, instead of this expertise flowing *into* EPA, what expertise that does exist internally flows out. This leaves EPA personnel evaluating contractors who have at least some people with a better foundation in the basics and more experience.

The dependence on outside contractors also isolates the workforce and makes transfer of knowledge more difficult. This means that detailed understanding of successes and failures are slow to reach the decentralized workforce (see box A). The logistics of transferring knowledge among EPA staff in 10 regional offices is difficult enough but the difficult is compounded by a need to transfer knowledge among a multitude of contractor staff. (Knowledge transfer is also aggravated by EPA's insistence that every site is different; the implication is that knowledge transfer is not critical. As each site starts through the system, the wheel gets reinvented.)[49]

In essence, the Superfund program develops contract managers rather than technical project managers. This is evident in how Superfund employees view training and courses. GAO surveyed EPA Super-

45 S. Schweich, a financial analyst, quoted in "Searching for the best and brightest," ENR, Oct. 20, 1988.

46 "Producers wary of new Superfund provisions," Chemical & Engineering News, November 3, 1986, p. 26.

47 U.S. Congress, General Accounting Office, Environmental Protection Agency: Protecting Human Health and the Environment through Improved Management, GAO/RCED-88-101 (Gaithersburg, MD: General Accounting Office, 1988), p. 234.

48 A temporary decrease in contractor spending is not, necessarily, seen as unacceptable by Superfund contractors. For example, Gary A. Dunbar of CDM said, "if proper management by government and prudence of program pace mean less money for contractors then that is what should be done." [Letter to OTA, Jan. 18, 1989.]

49 For example, significant portions of RIFSs are reproductions of data, procedures, statutory and regulatory requirements, and comments on generic cleanup technologies which appear, with minor variations, again and again. Also, see OTA's Are We Cleaning Up?

fund personnel and asked what kind of training they needed. The three areas most often mentioned were cleanup design and action, cost recovery, and legal case development.[50] Only the first has to do with the physical, technical, and environmental needs of the program. Cost recovery and legal case development deal ultimately with keeping the costs to the Fund down. It's a worthy goal but it simply shifts costs elsewhere. **Long-term development of technical expertise in EPA can ultimately drive the overall national costs down.**

One way suggested to overhaul Superfund is:

> The civil service positions would be restructured so they attract--and retain--more career employees. A good first step would be to bring EPA salaries into line with those of the private sector--a move that the General Accounting Office says is permissible when discrepancies are large. Over the long run, this step would cost less than continuing to rely on a large number of high-priced contractors. It would also improve the quality of work.[51]

## Conflict of Interest

Contracting by the Superfund program creates several areas of potential conflict of interest that can compromise environmental goals. They arise because there is one national pool of engineering and consulting firms that contracts its services to all branches of the Federal government, to State governments, and PRPs. Sometimes they work as prime contractors, other times as subcontractors who are subject to less scrutiny.

There is now no legal requirement for EPA to tell those using its products and services whether a contractor has been the sole source of the work or a major contributor to it. This means that there is often no sign that a particular contractor--or any contractor at all--has participated in an effort; thus often one cannot tell if there is any potential conflict of interest.[52] Greater public accountability and even motivation for higher quality work might result from more routine acknowledgement of contractor identity and contribution to Superfund activities.

EPA in advising States on Superfund contract requirements recognizes one category of contractor conflict of interest, but not as a given. The agency says:

> *In some instances*, construction contractors, who are PRPs at a site *may have* conflicts of interest which would prevent them from serving the best interest of the State and/or the Federal government as a remedial action contractor [emphasis added].[53]

The ultimate goal of EPA and State government programs, PRPs, and contractors is the same: to clean up sites effectively and at the lowest possible cost. But, they have different perspectives on what that means and how much it should cost. Local communities and PRPs are often at odds with one another over cleaning up sites.

---

50 U.S. Congress, U.S. General Accounting Office, Superfund: Improvements Needed in Work Force Management, op. cit.

51 J. L. Edelson, "Superfund - Still in the Dumps," Technology Review, December 1988.

52 For example, EPA's draft "Guidance on Remedial Actions for Contaminated Ground Water at Superfund Sites," potentially a very important document, has a contract number but no statement that it was prepared by a contractor. On a long list of people who assisted in preparing the document, all are from EPA except two from CH2M Hill and, in fact, the contractor was CH2M Hill, a long-time Superfund contractor under REM and now a major ARCS contractor. Moreover, this kind of activity would appear to offer a competitive advantage for a remedial contractor active in both the public and private cleanup markets. The document says that it is aimed at assisting, among others, contractors. Also, the important draft "Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA," only has a contract number; CH2M Hill was the contractor.

53 U.S. Environmental Protection Agency, "Interim Guidance on State Participation in Pre-Remedial and Remedial Response," memorandum, July 21, 1987, p. 21.

PRPs and their contractors are naturally concerned about costs and profits and are more likely to emphasize reduced cost, tolerate more risk, and view certain cleanup technologies and approaches as more permanent than do the local communities.

A recent analysis of cleanup decisions concluded, "When the PRP is willing to play an active role, the EPA is willing to negotiate and accommodate."[54] Moreover, the study also concluded, "Ultimately cost is the primary factor in setting cleanup standards." How well government officials can sort through the interests of the PRPs and communities depends, in large measure, on whether the government workers can **independently** assess the technical merits and environmental performance of PRP positions and the contractor studies which support them (see box A). **Under present conditions, the drive for more settlements with PRPs and their control of site studies and cleanups does not assure protection of health and the environment. A much improved and expanded EPA staff is required.**

EPA does forbid a prime contractor to work simultaneously and within three years on the same site for both EPA and the PRPs. This is an admission of conflict between the interests of EPA and PRPs, but this attempt to avoid conflicts has problems. First, enforcement relies on self reporting. While a good many contractors may, not all will necessarily do so. Second, a contractor working for EPA becomes privy to inside information--not generally available--simply in order to complete its assigned tasks for EPA. That kind of information has value not only regarding that particular site but can be of benefit to the PRP, or another PRP, at another site for which the contractor may be concurrently working or subsequently work. The information can also benefit the negotiating position of a PRP v. EPA at any other site in the Superfund program. Because the private cleanup market is also enormous, this factor is important in helping contractors with that side of their business.

Moreover, the three-year limit is low. It is not uncommon for sites to take 10 years to move through the remedial part of the Superfund program. It can take over three years just to complete an RIFS and ROD, the first phase. Thus, three years is not long enough to assure that a contractor responsible for the RIFS for EPA does not end up subsequently handling the design or implementation for the same site for the PRPs. Scrutiny by EPA could solve this potential problem.

Another, and perhaps growing, source of potential conflict is the tendency of vertical integration by contracting firms and PRPs. Conflict of interest may occur when contracting firms and PRPs develop financial interests in cleanup technology that may reduce the scope of remedial technologies examined and impair the ultimate decision. A number of contractors and PRPs own firms that develop or operate cleanup technology. For instance, Roy F. Weston, Inc., a major Superfund contractor owns a mobile incinerator and has also patented technology for low temperature thermal stripping of volatile organic chemicals from soils. Westinghouse plans to use its still unavailable incineration technology to clean up some of its Superfund sites in Indiana.

Will contractors and PRPs be biased toward using technology in which they have financial interest? This bias would not necessarily create a problem except that the contractors and, increasingly, PRPs control the analysis phase (RIFSs) that often results in the selection of a specific technology. In the case of the Indiana sites, this became a highly charged issue and continues to be a

54 C. F. Baies III and G. Marland, op. cit.

factor in the delayed cleanup implementation. The potential for bias and the control of the technology selection could be mitigated by strong EPA oversight and management of the process, particularly **after** a cleanup is selected in a ROD and legally embodied in a court's consent decree. But, that does not occur for the most part.[55]

As an example, at the Brown Wood Preserving Superfund site in Florida, the PRPs' contractor for the FS recommended a remedy adopted by EPA in April 1988. Over 95 percent of the site's contaminants were sent to a commercial landfill in Emelle, Alabama, and the remainder kept onsite for biological land treatment, a service provided by the FS contractor. The cost of this remedy ($2.7 million) is one half the estimated cost of using available mobile incineration. The shipment to the landfill was meant to precede EPA's own land disposal bans; incineration was acknowledged to be faster and more effective in satisfying statutory mandates. Thus, EPA accepted a cleanup proposed by a PRP (for a less than optimum remedy) in which both the PRPs and the FS contractor benefit financially. The PRPs saved $2.7 million and the study contractor got a cleanup job worth about $500,000.

55 See OTA's report Are We Cleaning Up? 10 Superfund Case Studies, June 1988.

## Fifth Key Issue:

# Is Superfund's Heavy Dependence On Contracting Cost Effective?

In 1987, EPA Administrator-designate William K. Reilly (then president of the Conservation Foundation) said:

> ... the Superfund program may well result in many billions of dollars being spent with little net reduction in risk to public health and the environment.[56]

Most of the billions are being spent for contractors, and there is growing awareness that the Superfund program's policy of heavy dependence on contractors has negative impact. The conference committee for EPA's fiscal year 1989 appropriations said, "The programs's heavy reliance on contractors creates a substantial risk of resources being wasted."[57] As that statement implies, the real question is not whether money is being saved but whether contracting on such a scale, with the existing degree of EPA management, is a cost-effective way of protecting human health and the environment.

A GAO report on Superfund concluded:

> EPA has not sufficiently monitored, controlled, and challenged contractor expenditures and professional hour usage for remedial studies. By not consistently and fully challenging questionable contractor costs, EPA could be conveying a message to contractors that it is willing to accept all costs regardless of the level of performance provided, thereby lessening the contractors' incentives to control costs. As a result, EPA may be paying more than needed for remedial studies.[58]

EPA's IG, in auditing fiscal 1987 Superfund contract costs, found that about 30 percent of contractor costs were questionable because they might be unallowable under provisions of applicable laws, regulations, or policies or were unacceptable without additional information or evaluations and approvals by responsible EPA officials.[59] The IG also noted, "We have repeatedly found that the Agency's management of Superfund needed improvement." Moreover, the IG has said that it does not have enough resources to carry out the level of auditing and investigation it deems necessary for Superfund.

A recent study on reducing cleanup costs through value engineering cited three examples where original contractor RIFSs performed on Superfund sites did not adequately address certain aspects of the selected remedies. When subsequent reviews and studies were performed at a cost of about $500,000, cleanup cost savings of about $5 million resulted.[60]

---

56 William K. Reilly, "State of the Environment: A View Toward the 90s," September 1987.

57 U.S. Congress, Conference Report 100-817, FY89 Appropriations for HUD and Independent Agencies, Aug. 3, 1988, p. 19.

58 U.S. Congress, General Accounting Office, Superfund Contracts - EPA Needs to Control Contractor Costs, RCED-88-182 (Gaithersburg, MD: General Accounting Office, July 1988).

59 U.S. Environmental Protection Agency, Office of Inspector General, Annual Superfund Report to the Congress for Fiscal 1987, September 1988.

60 P. F. O'Hara, et al., "Cost Effective Remediation Through Value Engineering," Superfund '88, conference proceedings (Silver Spring, MD: Hazardous Materials Control Research Institute, November 1988).

A study for the House of Representatives' Appropriations Committee said:

> The Region IX official also stated that EPA gives its contractors pre-negotiated, open-ended contracts with the result that the contractors, with EPA approval, spend too much to study issues ... contractors could cut months off study schedules if they did not spend so much time on 'simple things' and did not study everything 'to death.'[61]

## Cost Effectiveness of Contracting

**In theory** the competition of the marketplace means that the low-cost operator ultimately wins. Whether the same result occurs when the public sector contracts with the private sector instead of doing the work itself is not clear. One reason for the uncertainty is that cost comparability is difficult given the different accounting methods of the two sectors.

However, according to the General Accounting Office:

> ... in those instances where contractor costs are lower, this is generally because the contractor employs fewer persons and pays them less.[62]

But this does not appear to be the case for Superfund contracting.

The OMB rules for contracting out services require that costs of doing so be compared with the costs of providing the service inhouse. Under the Superfund program no comparative studies have been done. The **assumption** has been made that contracting saves money and provides for quality work.

That assumption overlooks a number of factors present within and around the Superfund program. For instance, when the Superfund program began there was a sudden high demand for--and low supply of--technical expertise. Congressional and EPA beliefs that a major contractor workforce was available for the rapidly expanding Superfund program were incorrect. An EPA official, explaining why removal contracts had not proved to be cost effective, stated in 1987:

> The contractors we have used have struggled very hard to do new tasks. They had a lot of unknowns. They took a lot of corporate risks. This was not a well-defined piece of work.[63]

As has been discovered over time, Superfund cleanups often require special expertise that was not and still is not readily available in the private sector. For instance, large numbers of experienced civil engineers, geologists, and hydrogeologists have no expertise or experience with toxic chemicals. EPA has found it necessary to provide training sessions for contractor staff (e.g., on cleanup technologies). To a large extent, the billions of dollars rapidly spent on Superfund have provided an opportunity for many contractors to start new businesses and to learn the new business of toxic waste cleanup. To some extent this was inevitable and has precedents in other fields. But the point here is that the rapid increase in spending on contractors was based on incorrect assumptions and that the efficiency of the program has suffered as a result.

With the reauthorization of the program in 1986 for annual budgets that equal the total authorized for the first five years and a congressional mandate to increase the pace of the program, another surge in demand was created. In fact, the problem is likely to get worse, if spending on cleanups--directly by

---

61 Surveys and Investigations Staff, op. cit.

62 U.S. Congress, Congressional Research Service, "Contracting Out", op. cit., p. viii.

63 U.S. Congress, Superfund Implementation, S. Hrg. 100-261, op. cit., p. 156.

government and by private parties--keeps escalating. The lagging supply of expertise means that the program continues to operate with minimal price/cost competition.

During the reauthorization process, the administration claimed that it could not spend as much money as Congress was willing to provide. One experienced lawyer, said at the time, "EPA will have more money than it can spend effectively."[64] Now, several years into the reauthorized [64]lear that the money will last five years. Indeed, many contractors spend all of their authorized hours or funds long before anticipated. Either poor estimates were made by EPA and contractors, or more hours are being spent carrying out a task because of problems in program management or contractor performance, or sites are more complex than originally thought. All of these factors seem to be relevant. Eventually, especially given the long-term nature of the program, the market will adjust, supply--particularly of experienced workers--will increase to meet the demand and unit costs may decrease. But, the government might get more control on costs sooner if the government itself does more of the work, if it could practice more stringent supervision of contractors, and if contractor spending is temporarily reduced.

Several other aspects of the Superfund program and contracting mentioned earlier also bear on the question of cost effectiveness. Statutory and public pressures to show high-paced performance, coupled with high EPA staff turnover and inexperienced EPA staff, reduce EPA's ability to exercise effective cost controls. The system of having EPA staff manage prime contractors who manage subcontractors creates several levels of overhead that are all ultimately paid for by the public, either directly through the trust fund or indirectly through PRPs. Whenever lack of proper management results in poor work that has to be repeated, the cost of doing that work doubles or more than doubles. Because of the fragmented nature of the workforce, many contractors doing the same kind of work needlessly develop the same databases and management systems. EPA has not made very wide use of generally useful data and software that the government has paid for in specific contracts.

## Government v. Private Sector Costs

OTA has not attempted to examine in detail the commonly held belief that private sector cleanup efforts are less costly than those contracted out by EPA. But this is a common assertion by many PRPs and one PRP has told OTA in writing, "I agree that EPA spends up to five times more than a private party for the same cleanup." It is also widely said that contractors have a higher profit margin when working for the private sector than for the government (although there is no dearth of contractors bidding for government work). In fact, some contractors have told OTA that their desire to do quality work requires higher prices but that the government will not pay the higher prices. Therefore, some firms specialize in private sector work.

Both apparently contradictory beliefs may be correct. While the unit contractor costs are probably higher for private sector work, the job is probably done with less work in the private sector. In other words, lower profit margins in the public sector are probably

64 "Producers wary of new Superfund provisions." Chemical & Engineering News, Nov. 3, 1986, p. 26.

offset by higher **volumes** of work. Many contractors have experienced very high growth rates and increased profits over the past several years because of government Superfund business.[65] This happened at a time when other engineering and construction markets shrunk. The profit margins of Superfund contractors are comparable to similar kinds of firms; for instance, construction project management firms typically have margins equal to or less than firms holding ARCS contracts.

Redundant contractor work, poorly defined work by the government, greater use of less experienced people, poorly supervised work that leads to late recognition of problems, greater concerns about being criticized which lead to unnecessary, *defensive* work, and changing agency policies and personnel all probably contribute to high government cleanup costs. From looking at actual costs and speaking to contractors and PRPs, **we find it plausible that the government may spend from 100 to 500 percent more than a private client would spend to accomplish essentially the same site study or cleanup.**

## Procurement

It is not only the contracting system that generates inefficiencies but how contacts are obtained can increase costs to the government. One problem is that the bid or negotiated cost of a contract may not accurately describe the ultimate cost of providing services. *Buying in* is a contracting phenomenon that Congress has criticized the Pentagon for accepting. In buying in a contractor bids or negotiates low and later rationalizes a need to increase funding in order to complete the tasks required. It takes an internal EPA staff with considerable expertise to know when a contractor has bought in. When this happens in Superfund, EPA has to confront the problem of sunk costs. EPA has to decide whether the tasks can best be completed at the higher cost suggested by a contractor or by terminating the contract and switching to a new contractor, who has to spend time reviewing the accomplishments to date (and possibly redoing some work) before completing the tasks. Or, EPA must decide not to reimburse certain contractor costs, such as for repeating faulty work. It appears that, often, EPA pays more money.

Another practice is to bid without having the people on staff to complete the project. After the contract is signed the contractor spends time and effort to acquire technical staff. Or, the people committed to originally, who are usually outstanding, are switched to another project. Substituting less experienced people can result in lower productivities and higher costs.

Another procurement problem which undermines competitiveness is *wiring* a contract; that is, when a firm is somehow assured of winning a contract. A lack of competitive bids for a contract can indicate widespread awareness by contractor firms that this is happening. The result is an unnecessarily high contract cost.

All these problems seem to have occurred in the Superfund program and all of them are not solely the responsibility of contractors, because the *government* should prevent such problems from occurring. These problems merit IG examination.

From a procurement perspective, the data in table 3 on recently awarded TES contracts

---

65 See, for example, the brochure announcing the "Hazardous Waste Business 89" conference in March 1989 which opens with "Win your share of the billion in profits ahead." The brochure goes on to give examples of success stories: companies whose revenues and profits have increased dramatically in recent years. Of the 24 sessions at the conference presented by the industry's leaders, not one deals with managing and assuring environmental performance or quality of company products or services. Three sessions focus on personnel issues, such as recruitment, training, retention, motivation, and preventing employees from becoming arch rivals.

might merit examination. The spread in contract amounts for what is supposed to be the same amount and type of work looks high. The difference between the highest and lowest amounts awarded is $29 million (i.e., $136 million versus $107 million). Although there might be regional differences in cost structures, the differences between the two winning contracts in each EPA region seems unusually high.[66] Five out of the six contracts were less than $131 million, the amount targeted by EPA, and apparently based on the experience with the previous TES contracts.

For three of four policy support Superfund contracts (see box B), hourly costs are in the $40 to $50 range which is consistent with the hourly costs in the six TES contracts. Both activities involve technical analysis to produce reports, rather than operational tasks or field activities as in REM and ARCS contracts. But the fourth policy contract (with CH2M Hill) has an hourly cost of $73, which seems high.

## Administrative Complexity

With its bureaucratic procedures, contracting adds inflexibility to the system and inflexibility adds to cost and time. Compare the following with the alternative of assigning a task to internal staff. To initiate a contractor assignment, the EPA RPM Primer advises:

> After completing the Work Assignment Package, you forward it to the RPO [Regional Project Officer] for approval. The RPO transmits the completed package to the Contracting Officer, with a copy for the Project Officer. The Contracting Officer then issues a work assignment to the contractor, who must prepare a Work Plan Memorandum for your approval within 10 days.[67]

And, what happens when a new piece of information on a site causes adjustment to the contractor's scope of work? How is that different from redirecting the work schedule of internal staff? The statement of work has to be amended, officially, in writing. For instance, in a hypothetical case where a site visit has turned up a previously unknown potential threat, the EPA's RPM Primer says:

> In addition to drafting the Work Plan [for the RIFS], the contractor will also be working on the EE/CA [Engineering Evaluation and Cost Assessment] for the ERA [Expedited Response Action] and a CRP update. You amend the interim scope of work activities to include preparation of the EE/CA. This is done via approval of an interim amendment on the Work Assignment Form.[68]

## Dependent Bureaucracies

Instead of an *internal* bureaucracy, an encircling one with close ties to EPA's Superfund program has grown up within the private sector. This constituency exerts the same kinds of pressures that an internal bureaucracy would (such as desire for permanence and expansion) while being less subject to government control and public scrutiny.

Superfund conventions, conferences, and trade shows represent an expanding business too. Annually, the largest occurs in Washington, DC. EPA is the chief affiliate sponsor; EPA's contractors and staff dominate the technical meetings. Contractors receive funds to attend such meetings.

---

66 For example, compare with the five largest ARCS contracts in Region 5, as shown in Table 4. The ARCS are much more complicated contracts than TES. But the spread for the ARCS is $15 million on a base about twice as large as TES, while the spread in Region 1 for TES is $12 million.

67 U.S. Environmental Protection Agency, "The RPM Primer," OSWER Directive 355.1-02, September 1987, p. 10.

68 Ibid, p. 20.

There is virtually no representation or attendance by people from environmental, public interest, or community organizations, and attendance by technical people from PRPs is minimal. The atmosphere and program content is self-congratulatory rather than critical self-appraisal and effective information transfer. Interfering with information transfer is the fact that the conference also serves as a job clearinghouse that exacerbates the government brain drain and the mobility of people among contractors.

## Superintendent of Documents Publication Order Form

Order Processing Code
***6563**

*Charge your order. It's easy!*

☐ **YES,** please send me the following indicated publications:

***Assessing Contractor Use in Superfund—A Background Paper***
**GPO stock number 052-003-01147-6; price $2.50.**

1. The total cost of my order is $_____ (International customers please add an additional 25%.) All prices include regular domestic postage and handling and are good through 8/89. After this date, please call Order and Information Desk at 202-783-3238 to verify prices.

**Please Type or Print**

2. _____
(Company or personal name)

_____
(Additional address/attention line)

_____
(Street address)

_____
(City, State, ZIP Code)

(_____)
(Daytime phone including area code)

**3. Please choose method of payment:**

☐ Check payable to the Superintendent of Documents
☐ GPO Deposit Account ☐☐☐☐☐☐☐-☐
☐ VISA, CHOICE or MasterCard Account
☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

_____
(Credit card expiration date)

***Thank you for your order!***

_____
(Signature)

2/89

4. **Mail To:** Superintendent of Documents, Government Printing Office, Washington, D.C. 20402-9325

## Office of Technology Assessment

The Office of Technology Assessment (OTA) was created in 1972 as an analytical arm of Congress. OTA's basic function is to help legislative policymakers anticipate and plan for the consequences of technological changes and to examine the many ways, expected and unexpected, in which technology affects people's lives. The assessment of technology calls for exploration of the physical, biological, economic, social, and political impacts that can result from applications of scientific knowledge. OTA provides Congress with independent and timely information about the potential effects—both beneficial and harmful—of technological applications.

Requests for studies are made by chairmen of standing committees of the House of Representatives or Senate; by the Technology Assessment Board, the governing body of OTA; or by the Director of OTA in consultation with the Board.

The Technology Assessment Board is composed of six members of the House, six members of the Senate, and the OTA Director, who is a nonvoting member.

OTA has studies under way in nine program areas: energy and materials; industry, technology, and employment; international security and commerce; biological applications; food and renewable resources; health; communication and information technologies; oceans and environment; and science, education, and transportation.

CONGRESS OF THE UNITED STATES
OFFICE OF TECHNOLOGY ASSESSMENT
WASHINGTON, D.C. 20510-8025

OFFICIAL BUSINESS
PENALTY FOR PRIVATE USE, $300

POSTAGE AND FEES PAID
OFFICE OF TECHNOLOGY ASSESSMENT
379

OTA-BP-ITE-51

JANUARY 1989